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Appendix A: Environmental Assessment

Finding of No Significant Impact

Environmental Assessment and Comprehensive Conservation Plan for the Shiawassee National Wildlife Refuge, Michigan

An Environmental Assessment (EA) has been prepared to identify management strategies to meet the conservation goals of the Shiawassee National Wildlife Refuge (Shiawassee Refuge). The EA examined the environmental consequences that each management alternative could have on the quality of the physical, biological, and human environment, as required by the National Environmental Policy Act of 1969 (NEPA). The EA presented and evaluated four alternatives for managing fish, wildlife and plant habitats, as well as visitor services, on the Shiawassee Refuge over the course of the next 15 years:

Alternative A. No Action (Current Management). The No Action alternative encouraged existing, or status quo, refuge management practices. Land use patterns and visitor services would remain at current levels.

Alternative B. Historical Habitats. This alternative favored a return to pre-settlement habitat conditions. The strategy would allow natural events to occur. Levees would not be maintained Visitor use would likely decrease due to less accessibility to flooded areas.

Alternative C. Expanded Management (Preferred). Management would focus on a balance of conditions that could enhance diversity in areas such as public use, habitat, and fish and wildlife populations. The current mix of habitats would be altered by the reduction in cropland and increased diversity of forests through selective cutting. Visitor services and use would increase.

Alternative D. Overall Intensive Management. Under this alternative, management would focus on aggressive management of current conditions such as greatly increased public use and intense fish and wildlife habitat manipulations.

The alternative selected for implementation is ***Alternative C***. The strategies presented in the Comprehensive Conservation Plan (CCP) were developed as a direct result of the selection of this alternative. Forest management, as well as carefully timed water level adjustments in the impoundments, would benefit a variety of fish and wildlife plant species identified as Resource Conservation Priority species by the Service. Habitats would be managed for nesting and migrating songbirds, waterfowl and shorebirds. Visitors to the refuge will also benefit as a new auto route, expanded environmental education program, and a Great Lakes Discovery Center are all proposed within the CCP.

For reasons presented above and below, and based on an evaluation of the information contained in the Environmental Assessment, we have determined that the action of adopting Alternative C as the management alternative for the Shiawassee Refuge CCP is not a major federal action

which would significantly affect the quality of the human environment, within the meaning of Section 102 (2)(c) of the National Environmental Policy Act of 1969.

Additional Reasons:

1. Future management actions will have a neutral or positive impact on the local economy.
2. A cultural resource inventory completed prior to this CCP included recommendations for the protection of cultural, archaeological and historical resources.
3. This action will not have an adverse impact on threatened or endangered species.

Supporting References:

Environmental Assessment
Comprehensive Conservation Plan

Regional Director

9/19/01
Date

Great Lakes - Big Rivers Region
Bishop Henry Whipple Federal Building
Fort Snelling, MN 55111-4056

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Appendix A: Environmental Assessment
Shiawassee National Wildlife Refuge
Comprehensive Conservation Plan
July 2001

Abstract

The U.S. Fish and Wildlife Service is proposing management direction for the next 15 years for the Shiawassee National Wildlife Refuge (Refuge) in Saginaw County, Michigan. This Environmental Assessment considers the biological, environmental and socioeconomic effects that implementing the management direction will have on the most significant issues and concerns identified during the planning process. The preferred management direction is described in detail in a Comprehensive Conservation Plan (CCP).

The purpose of the Plan is to:

- Provide partners and local communities with a clear statement of the desired condition of the Refuge in the next 15 years.
- Ensure that management of the Refuge reflects the policies and goals of the National Wildlife Refuge System.
- Ensure that Refuge management is consistent with federal, state, county, and partner plans and studies.
- Provide Refuge staff with guidance and priorities for budget requests and for the consistent development, operation, and management of the Refuge over the next 15 years.

Responsible Agency and Official:

William Hartwig, Regional Director
U. S. Fish and Wildlife Service
Henry Whipple Federal Building
1 Federal Drive
Fort Snelling, Minnesota 55111-4056

Contacts for additional information about this project:

Douglas Spencer, Refuge Manager
Shiawassee National Wildlife Refuge
6975 Mower Road
Saginaw, MI 48601
989/777-5930

John Schomaker, Project Coordinator
U.S. Fish and Wildlife Service
1 Federal Drive
Fort Snelling, MN 55111-4056
612/713-5476

Chapter 1: Purpose and Need for the Proposed Action

Purpose and Need for Action

The purpose of the proposed action is to specify a management direction for Shiawassee National Wildlife Refuge for the next 15 years. This management direction will be described in detail through a set of goals, objectives, and strategies in a Comprehensive Conservation Plan.

The action is needed because adequate long-term management direction does not exist for Shiawassee National Wildlife Refuge. Management is now loosely guided by general policies, short-term plans, and a master plan that is more than 20 years old. Also, the action is needed to address current management issues, which are discussed below, and to satisfy the legislative mandates of the National Wildlife System Improvement Act of 1997, which requires the preparation of a Comprehensive Conservation Plan for all national wildlife refuges.

We prepared this Environmental Assessment (EA) using guidelines of the National Environmental Policy Act of 1969. The Act requires us to examine the effects of proposed actions on the natural and human environment. In the following sections we describe four alternatives for future Refuge management, the environmental consequences of each alternative, and our preferred management direction. We designed each alternative as a reasonable mix of fish and wildlife habitat prescriptions and wildlife-dependent recreational opportunities, and then we identified our preferred alternative based on their environmental consequences and their ability to achieve the Refuge's purpose.

Background

The Shiawassee National Wildlife Refuge (Refuge) was established in 1953 and includes 9,706 acres. The Refuge is located within Saginaw County, Michigan and is surrounded by both urban and agricultural areas. Shiawassee National Wildlife Refuge manages a variety of habitats that provide resting, foraging, and nesting opportunities for nearly 300 species of resident and migratory birds. The major habitat types include wetlands (3,771 acres), forests (4,225 acres), agricultural lands (1,180 acres), and grasslands (580 acres). This diversity of habitats also supports an abundance of plant, mammal, reptile, amphibian, and fish species.

The management techniques currently used on the Refuge include control of water levels in moist soil units and pools, biological and chemical control of invasive plant species, prescribed burning, mowing, and hunting of white-tail deer and Canada geese.

In 1995, the U.S. Fish and Wildlife Service considered alternative ways to better protect the Refuge resources at Shiawassee NWR. After evaluating the alternatives, the Service decided to pursue the addition of approximately 7,500 acres to the existing Refuge (Shiawassee National Wildlife Refuge Additions Final Environmental Assessment, 1995) The additions will be primarily along the Tittabawassee and Cass River corridors. These waterways are two of the four rivers that converge on the Refuge and make up Michigan's largest watershed, and their environmental integrity is vital to the health of the Refuge's core.

In 1997, the U.S. Fish and Wildlife Service began preparing a Comprehensive Conservation Plan for Shiawassee National Wildlife Refuge. The CCP outlines the management of wildlife habitat and development of public use facilities and programs at the Refuge for the next 15 years. The plan provides a comprehensive framework for future management and identifies management strategies as well as locations and priorities for habitat and public use development. Step-down management plans will be developed to provide further detailed guidance for inventory and monitoring, public use, environmental education and interpretation, fishing, forest management, law enforcement, and cultural resources management.

Decision Framework

The Regional Director for the Great Lakes-Big Rivers Region of the U. S. Fish and Wildlife Service will use the Environmental Assessment to select one of four alternatives and determine whether the alternative selected will have significant environmental impacts requiring preparation of an environmental impact statement. Specifically, analysis and findings described in this EA will help the Regional Director decide whether to continue with current management at the Refuge (no action) or to adopt another approach to management.

For details beyond those included in this Environmental Assessment, the reader should refer to the Comprehensive Conservation Plan for Shiawassee National Wildlife Refuge. The most relevant information in the CCP is contained in "Refuge Goals, Objectives and Strategies."

Authority, Legal Compliance, and Compatibility

The National Wildlife Refuge System includes federal lands managed primarily to provide habitat for a diversity of wildlife species. National wildlife refuges are established under many different authorities and funding sources for a variety of purposes. The purpose(s) for which a particular refuge is established are specified in the authorizing document for that refuge. These purposes guide the establishment, design, and management of the Refuge. The Refuge was established under the Migratory Bird Conservation Act and the Refuge Recreation Act "for use as an inviolate sanctuary, or any other management purpose, for migratory birds" and "for (1) incidental fish and wildlife oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered or threatened species."

Additional authority delegated by Congress, federal regulations/guidelines, executive orders and several management plans guide the operation and the management of the Refuge and provide the framework for the Fish and Wildlife Service's proposed action. The key legislation and orders that guide the Refuge are summarized in Appendix F of the CCP.

Scoping of the Issues

Scoping is the process of identifying opportunities and issues that can be used to develop and evaluate alternative approaches to management. The Fish and Wildlife Service publicly announced it was preparing a plan for the Shiawassee National Wildlife Refuge in December 1997.

Scoping involved:

- Issuing News Releases
- Conducting Sessions with Focus Groups
- Holding Public Information and Input Meetings

For additional detail on these activities see Chapter 1 of the Comprehensive Conservation Plan.

Issues and Concerns

From public involvement activities, the Service received several comments that identified issues and concerns people had related to management of the Refuge. These "scoping" issues have been considered in evaluating potential management alternatives and several have been directly integrated into the Comprehensive Conservation Plan.

This Environmental Assessment informs the public of the impact the proposed action (implementing the preferred managment alternative) will have on each of the four major issue categories. All issues are described in the CCP and many of the goals and strategies contained in the CCP relate to one or more of the issue categories. The four issue categories are summarized as:

Public Use Issues

Participants in open house events and focus group meetings expressed a wide range of philosophies on public use of Shiawassee National Wildlife Refuge. Some people would like to see management of the Refuge focus on wildlife and habitat with no increase of public access and public use of the Refuge. Other people would like to see an expanded trail system and enhanced access for activities such as horseback riding, automobile tours, environmental education, hiking, hunting, fishing, boating, and bicycling.

The subject of airboats on rivers flowing through the Refuge drew a strong response from people who believe that the Refuge should provide a tranquil place to view birds. Airboat operators were described as having "disregard" for anglers and wildlife observers. Comments included concerns about safety on the river as well as the noise disturbance.

Resource Protection Issues

Meeting participants voiced many opinions about the priority of resource protection issues. Some people said that enhanced law enforcement is a critical need, and others said that reducing the amount of sediment and chemical waste that flows through the Refuge should be a priority. Control of exotic species, such as purple loosestrife, round goby and zebra mussel, as well as invasive species such as phragmites, were cited as a protection issues. Concern was also expressed about mosquito control. Prioritizing land acquisition is another expansion issue facing Shiawassee National Wildlife Refuge, according to open house and focus group participants.

Maintenance Issues

Dike maintenance was the primary maintenance issue that emerged from the public involvement process. The need to maintain dikes was described as a top priority, particularly for dikes damaged by burrowing muskrats and, in

moist soil units, wave action. Recognizing the role the Refuge plays in relieving flood pressure, people recommended conserving some areas of the Refuge as flood retention areas.

General Issues

Some people said that the cultural diversity efforts at the Refuge are failing to reach targeted communities. Others suggested that monitoring of the Partners for Wildlife habitat restoration efforts is needed to evaluate what has been accomplished so far. Comments on revenue issues included statements that current staffing at Shiawassee National Wildlife Refuge needs more funding. Other participants questioned the U.S. Fish and Wildlife Service's plans to expand the Refuge when its ability to manage or maintain the existing wildlife Refuge is already a challenge.

Chapter 2: Alternatives for Management

Introduction

Four proposed management alternatives were developed during the course of planning the comprehensive conservation plan and complementary environmental assessment. During the planning process, the Service planning team identified Alternative C, Expanded Management, as the preferred alternative. The Comprehensive Conservation Plan was developed as a result of selecting Alternative C.

The land use patterns for all alternatives are summarized in Table 1. These alternatives are discussed within this chapter and summarized in Table 2 (page 96). Chapter 4 evaluates the alternatives based on issues raised during the planning process.

Land Exchange

The Refuge has sought to exchange certain lands with the State of Michigan for several years. The intention is to pursue the land exchange to better our management and acquire additional habitat for wildlife under each alternative. The exchange would transfer the area in and around Pool 4 to the State of Michigan. In exchange the Refuge would acquire land of equivalent value on the east side of the Refuge near Highway 13. Figure 4.5 in the CCP depicts the lands involved in the exchange.

Table 1: Land Use Patterns, Shiawassee National Wildlife Refuge

Comparison of Alternatives by Acreage

	Alternative A	Alternative B	Alternative C	Alternative D
Wetlands	3,479	3,979	3,613	3,613
Forests	3,445	3,945	3,518	3,518
Grasslands	580	1,010	1,803	1,803
Administrative	50	50	50	50
Croplands	1,430			

Mosquito Control

The Refuge System Improvement Act of 1997 and the resulting policy have caused a re-examination of mosquito control on the Refuge. The Improvement Act states that "the Secretary shall not ... renew or extend an existing use of a refuge, unless the Secretary has determined that the use is a compatible use and that the use is not inconsistent with public safety. The Secretary may make the determinations referred to in this paragraph for a refuge concurrently with development of a conservation plan ..." Based on the requirements of the Improvement Act and the experience and evaluation of the program at Minnesota Valley National Wildlife Refuge that prohibits mosquito control, Region 3 has decided to prohibit treatment of refuge lands for mosquitoes except in the event of an emergency when there is a real and imminent threat to human health. Therefore, the policy of Region 3, U.S. Fish and Wildlife Service is to prohibit treatment of Shiawassee National Wildlife Refuge lands for mosquitoes except in the case of an emergency when there is a real and imminent threat to human health. With the exception of the no action alternative, the policy of prohibiting mosquito control is followed under each alternative.

Formulations of Alternatives

The four alternatives that were developed for this Environmental Assessment range from "No Action" to "Overall Intensive Management." All of the four alternatives would serve the primary purpose for which the Refuge was established, but the end results would vary. Refuge and Service goals and objectives play an important role in the variances that would result from implementation of any one of the alternatives.

They include:
Alternative A, No Action: Management practices continue in this alternative;

Alternative B, Historical: Under this alternative, management would focus on pre-settlement conditions;

Alternative C, Expanded Management (Preferred): Management would focus on a balance of conditions that could enhance diversity in areas such as public use, habitat, and fish and wildlife populations;

Alternative D, Overall Intensive Management: Under this alternative, management would focus on aggressive management of current conditions such as greatly increased public use and intense fish and wildlife habitat manipulations.

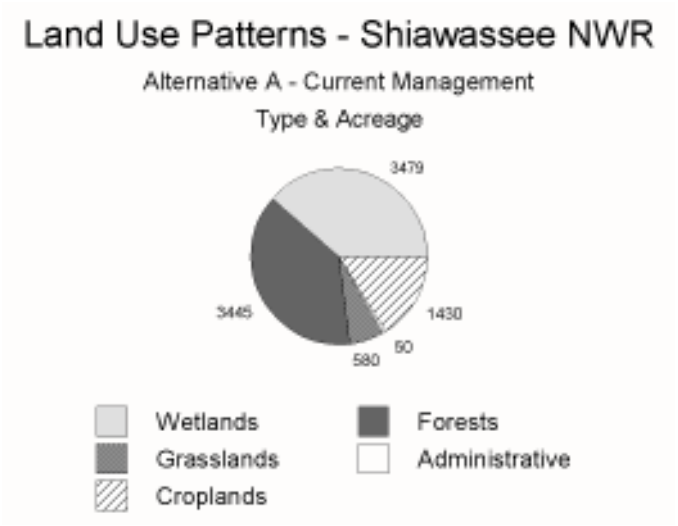
Descriptions of Alternatives

Alternative A, No Action

Present management practices continue if this Alternative is selected.

The No Action alternative is a status quo alternative where current conditions and trends continue. It also serves as the baseline to compare and contrast all other alternatives.

Figure 1



Wildlife Populations: Shiawassee is a significant concentration area for waterfowl during spring and fall migrations. Canada geese, tundra swans, dabbling ducks such as mallard, teal, and wood ducks, and diving ducks such as mergansers, canvasback, and buffleheads all benefit from current management practices.

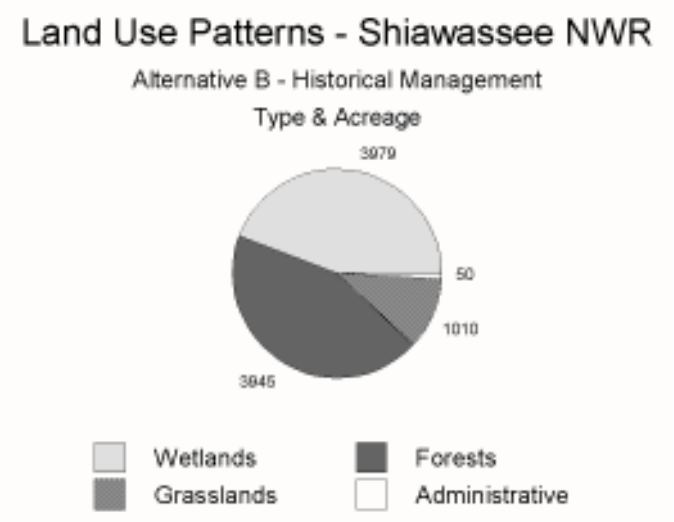
The Refuge is also managed to support a federally-listed threatened species.

Habitat Manipulations: Current land use patterns would continue as shown in Figure 1. Present habitat diversity supports songbirds in addition to migratory birds, deer, furbearers, reptiles, amphibians, and insects.

Farming, used as a wildlife management tool, would also remain at current conditions.

Public Use: Public use and access would be maintained at current levels (70,000 visits) and would include hiking, biking, and skiing on established nature trails and participating in controlled goose and deer hunts. Environmental education efforts would remain constant at present levels.

Figure 2



Alternative B – Historical

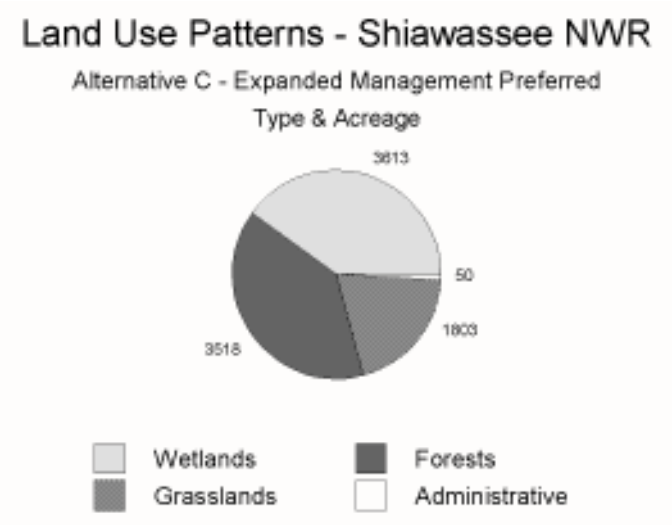
Management practices would change to allow the Refuge to revert to pre-settlement conditions.

Under this alternative the Refuge would drastically alter management practices. Levees would be broken and farming operations would cease. Natural events such as drought, flooding, fire, and plant succession would be allowed to occur.

Farming would decrease in the short-term and be abolished in the long-term as dikes and levees are removed and more natural ecosystems are established. Croplands would be converted into forests, wetlands, and prairies. Distribution and acreage of habitat types under Alternative B are shown in Figure 2.

Public use activities would be allowed to continue, including hunting and environmental education programs.

Figure 3



Alternative C – Expanded Management (Preferred)
Management activities overall would be expanded as defined by Refuge goals, objectives, and strategies developed in Chapter 4 of the CCP.

Many present management techniques would remain under this alternative to allow for restoration and maintenance of marshes, moist soil units, grasslands, and floodplain forests at more intensive levels than current conditions. Management activities would help accomplish goals and objectives of the Great Lakes Ecosystem.

Distribution and acreage of habitat types under Alternative C are shown in Figure 3.

Fish and wildlife populations would be managed using sound biological practices.

In the short-term, cropland acreage would be reduced by 30 percent; these 350 acres would be converted to moist soil units. In the long-term, cropland would be eliminated and converted to other habitats. Improvements in diversity of species and populations of forest interior bird species would be accomplished using selective cutting to achieve a multilayer forest and maintaining multiple blocks of 100-acre tracts of bottomland hardwood forest

Public use would be further increased and enhanced through the use of wildlife-dependent quality recreational and educational programs. Opportunities for stream bank fishing would be enhanced. Current fishing opportunities exist from water access only. At least one site would include an accessible fishing/dock platform. Within Refuge boundaries, disturbance to visitors, fish and wildlife, and habitat would be minimized from activities associated with the use of airboats, hydroplanes, and personal watercraft.

The hunting program would be maintained at current levels.

Additional hiking, bicycling, and cross country ski trails would be open nearly year-round and would include an auto tour route that would be open six months of the year. Appropriate interpretive and information signing would be incorporated into all trails and auto tour routes. Increased efforts to contact and inform the public would be implemented, both on and off-site. Environmental education facilities on the Refuge would be improved to make the area more attractive and convenient for participants.

Facilities at the Green Point Environmental Learning Center would be upgraded by the use of partnerships and outside funding. The Center would become known as a resource center to provide references, sample curriculums, and other media to improve the quality of environmental education resources.

Service efforts to enhance the quality and quantity of public use and environmental education programs would include promoting the goals and objectives of the Great Lakes Ecosystem Team and partnerships to develop, maintain,

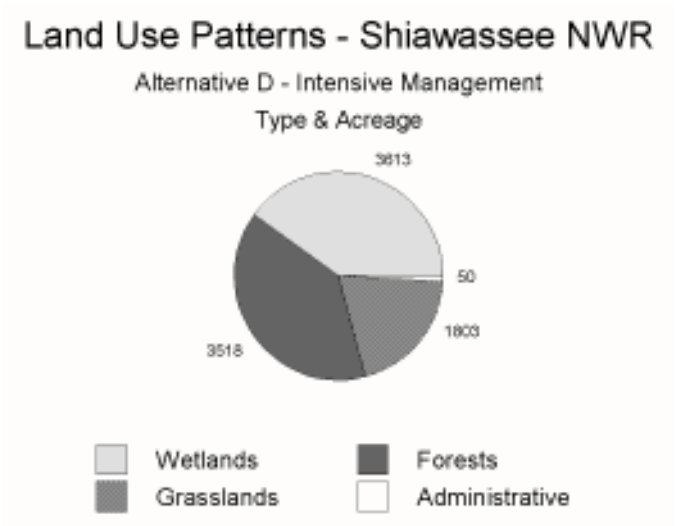
and staff Great Lakes Discovery Center. If this alternative is chosen and the planning of the Great Lakes Discovery Center proceeds, an environmental assessment will be completed for the Center as plans become more certain.

Current partnerships with Refuge support groups such as the Friends of The Shiawassee National Wildlife Refuge would be enhanced to provide additional outreach events that promote Refuge resources and to publicly recognize such groups.

Alternative D – Overall Intensive Management

Management would be focused on aggressive management of current conditions such as greatly increased public use and intense fish and wildlife habitat manipulations.

Figure 4



This alternative would be similar to Alternative C but would be at a higher level of intensity. The conditions of implementing this alternative would be contingent upon unlimited funding and staffing. Because funding would not be restrictive, full potential of the Refuge could be realized. Alternative D would result in the ideal or highest use of the natural resources of the Refuge for the benefit of fish and wildlife and their habitats and associated wildlife-dependent recreation.

Land use patterns are depicted in Figure 4.

Other Alternatives Considered but not Further Developed

No other alternatives were considered.

Chapter 3: Affected Environment

The Refuge represents an important waterfowl concentration area and crossroads for migrating geese, ducks, and other migratory birds. The Refuge is a combination of cropland, wetlands, bottomland hardwood forest, and scattered grasslands. Historically, the area was forested bottomland with scattered marshes. The Refuge lies in the floodplain of the Tittabawassee, Shiawassee, Flint and Cass rivers. Flooding occurs almost every year. Because they are continually eroded by flooding and wave action, Refuge dikes require frequent repair to the slopes.

Vegetation

Water and the effects of water dominate the ecological processes on the Refuge. A variety of vegetative communities that are associated with large rivers and their floodplains are found within the authorized boundaries of the

Refuge. These communities include some of the last remaining bottomland hardwood forests in Saginaw County. Another dominant community type is emergent marsh habitat. A shrub and grass habitat type is often found along the edges of the marsh community. There are also areas of open land vegetation, which includes the grasslands and croplands. The croplands are usually farmed for corn, winter wheat, soybeans or barley. The grasslands are usually abandoned farmlands that are seasonally flooded and are reverting to open field habitats. Upland forest is another vegetation cover type found on slightly higher elevations and in drier soil conditions.

Birds

The Refuge's array of habitats satisfy the requirements of diverse birds. More than 260 species of birds use the Shiawassee Flats area. The Tittabawassee, Shiawassee, Flint and Cass River bottoms are important stopover habitats for migrating waterfowl. Portions of the waterfowl flights from both the Mississippi and Atlantic flyways use this area each spring and fall. Two notable species that are common on the Refuge in the fall, winter, and early spring are the American black duck and Canada geese from the Southern James Bay Population. Refuge wetlands provide food, nesting, and roosting areas for more than 40 species of shore and wading birds. The bottomland forests in the Refuge are important habitats for many neo-tropical migrants and other songbirds. Refuge grasslands provide food, nesting, and cover for more than 20 species of passerines. The Refuge supports at least 15 species of raptors on a seasonal or permanent basis.

Mammals

More than 30 mammals have been recorded in or near the Refuge. White-tailed deer are abundant in the area because of the mix of forested lands, wetlands, shrubs, croplands, and grasslands.

Reptiles and Amphibians

Surveys have recorded 18 species of reptiles and amphibians on the Refuge and its expansion area.

Threatened and Endangered Species

The bald eagle is the only federally-listed threatened animal species that regularly uses Shiawassee National Wildlife Refuge.

Fish

The Refuge's sloughs, rivers, and marshes support more than 70 species of forage and game fish. Because of the Refuge's location at the junction of all the major tributaries forming the Saginaw River and its connection with Saginaw Bay, its wetland habitats are integral for life stages to many of the fish using the bay. These habitats are critical, particularly as spawning and nursery areas. With diminishing wetland resources the Refuge has a unique role in protecting fish habitat and valuable fish resources.

Land Use

The area within the authorized boundary of the Refuge totals 16,600 acres. Portions of the Refuge are adjacent to the Saginaw metropolitan area, with residential developments bordering several sections of the Refuge. Overall

trends in the Saginaw area are toward continued development and movement from urban to rural areas. Agriculture lands are being altered by urban sprawl and development.

Mosquito Control

The Saginaw County Mosquito Abatement Commission controls nuisance and disease vectoring mosquitoes in Saginaw County. The Commission's activities include disease and mosquito surveillance, killing mosquito larvae and adults, reducing sources, and public education. The Commission carries out operations on approximately 4,000 acres of land within the authorized boundaries of the Refuge.

Contaminants

Principal contaminants present within the authorized boundaries of the Refuge include those associated with point and nonpoint sources from industrial, municipal, and agricultural operations.

Cultural Resources

Shiawassee National Wildlife Refuge has 31 reported archeological sites on Refuge land. The land on which Shiawassee National Wildlife Refuge is located appears to have been empty of human occupation during the late prehistoric and proto-historic periods, although hunting parties from several tribes traversed it. Thus, determining an association between prehistoric cultures that created the archeological sites and modern Indian tribes is problematic. The Refuge Manager considers potential impacts of management activities on historic properties, archeological sites, traditional cultural properties, sacred sites, human remains and cultural materials.

Public Use

Public use at Shiawassee National Wildlife Refuge has grown steadily over the last decade. Approximately 70,000 refuge visits occur each year. In 1998, hunting, fishing, and trapping accounted for 6 percent of the total visitation. Hiking, bicycling, cross country skiing, wildlife observation, and photography accounted for 82 percent. Education accounted for 5 percent. The Refuge holds a managed goose hunt and a deer hunt. Fishing is not allowed from the shoreline. The Green Point Environmental Learning Center is the primary facility devoted to environmental education. People have complained about the use of airboats on rivers flowing through the Refuge. Airboat operators are described as having "disregard" for anglers and wildlife observers. Visitors to the Refuge have expressed a desire for more law enforcement presence to enhance visitor safety and enforce wildlife laws and regulations.

Pest Management

With high densities, white-tailed deer, muskrat, beaver, raccoons, and woodchucks can severely affect habitat quality or other species. Through management, the Refuge maintains acceptable densities of these species. To reduce encroachment of invasive and pest plants, the Refuge uses several management techniques – hand pulling individual plants, mowing, burning, water level manipulations, plowing, and chemical and biological applications. The Refuge has agreements with partner agencies to treat insect pests when outbreaks reach detrimental levels.

See Chapter 3 of the Comprehensive Conservation Plan for more details.

Chapter 4: Environmental Consequences

Effects Common to All Alternatives

Mosquitoes

With the reduction in mosquito control, there is the potential for more complaints about nuisance mosquitoes in the spring of the year. Depending on amount and timing of flooding in the wooded areas of the Refuge and depending on the strength and direction of winds, neighbors near the Refuge may perceive an increase in nuisance mosquitoes. However, given other sources of mosquitoes and natural variations, the change in mosquito populations in backyards may not be perceptible to the Refuge's neighbors.

Prioritize Potential Land Acquisition

Land acquisition follows the priorities set in the expansion Environmental Assessment under all alternatives.

Land Exchange

A land exchange with Michigan will add priority lands to the Refuge in exchange for lands in and around Pool 4. Wildlife benefits associated with Pool 4 are expected to continue under state management. There will be no effect on threatened and endangered species due to the exchange. Management efficiency is expected to increase as part of the exchange.

Environmental Justice

Executive Order 12898 "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" was signed by President Bill Clinton on February 11, 1994, to focus Federal attention on the environmental and human health conditions of minority and low-income populations with the goal of achieving environmental protection for all communities. The Order directed Federal agencies to develop environmental justice strategies to aid in identifying and addressing disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations. The Order is also intended to promote nondiscrimination in Federal programs substantially affecting human health and the environment, and to provide minority and low-income communities access to public information and participation in matters relating to human health or the environment.

None of the proposed management alternatives disproportionately place an adverse environmental, economic, social, or health impacts on minority or low-income populations.

Cultural and Historic Resources

Shiawassee National Wildlife Refuge has 31 reported sites on Refuge land and 42 known sites in the expansion area. Sites can include prehistoric archeological sites, historic archeological sites (Indian and Western), industrial and mining sites, farmsteads, and timbering sites. Prior to Refuge undertakings in each alternative, appropriate efforts would be made to identify known and unknown cultural resources within the area of potential effects, with avoidance of cultural resources being the preferred treatment.

Threatened and Endangered Species

Bald eagles, a federally-listed threatened species, frequently use the Refuge. Other federally-listed species that have the potential to be found locally in suitable habitats include the Indiana bat (endangered) and the eastern prairie fringed orchid (threatened), although neither of these species have been documented on the Refuge. In each alternative care would be taken to protect the nesting, feeding, and resting habitat of bald eagles. None of the alternatives propose activities that would adversely impact potential roosting and foraging habitats of the Indiana bat. None of the alternatives reduce the potential for the eastern prairie fringed orchid.

Alternative A – Current Management (No Action)

Wildlife diversity continues and includes the species listed in Appendix E of the comprehensive conservation plan. Under this alternative, segments of the public continue to feel excluded from the Refuge. These segments include persons with mobility impairments, horseback riders, and bank fishermen. Refuge visitors and neighbors continue to be disturbed by airboat noise and speed. Public perception is that illegal activities are greater than necessary because of lack of law enforcement; maintenance of Refuge facilities is inadequate. Contaminants entering the Refuge will be minimally monitored. Exotic species will be controlled according to an Integrated Pest Management Plan. Dikes are maintained with occasional delays in repairing them. The Refuge serves as floodwater storage when consistent with wetland management plans. Cultural diversity efforts continue to be focused on Buena Vista School and the University of Michigan. The activities of the Partners for Wildlife program are documented in the files. Conservation easements are inspected infrequently. Under current funding levels, public perception of needed and timely repairs continues.

Alternative B – Historical Vegetation Management

Under this alternative, crop food for resident deer and geese will be eliminated and there will be increased depredation of crops on neighboring farms. As natural succession occurs, there will be an expected increase in forest and scrub-shrub habitat. Because of increased acreage of all habitat types, higher populations of existing species would increase. Species that require larger blocks would be provided higher quality habitat. Habitat for fish spawning would increase dramatically. Public use would likely decrease due to less accessibility to flooded areas. By demonstration, the public may develop greater appreciation for the historical landscape and the changes that have occurred through lumbering and agriculture. Public perception of access, airboat noise, and need for law enforcement would continue as in Alternative A. Contaminants entering the Refuge will be minimally monitored. Because less funds will go to dike maintenance, other facilities may be better maintained and the public will perceive improved maintenance of the remaining facilities. The Refuge will serve as a greater reservoir of floodwater during floods, reducing flooding pressure to some extent for surrounding communities and agricultural lands. Cooperative farmers would lose acreage, and they would either lose income or need to find alternative land to farm. Cultural diversity efforts continue to be focused on Buena Vista School

and the University of Michigan. The activities of the Partners for Wildlife program are documented in the files. Conservation easements are inspected infrequently.

Alternative C –Expanded Management (Preferred)

Under this alternative, existing wildlife diversity and abundance is enhanced, particularly for forest interior species. Deposition of silt on the Refuge is reduced. Monitoring and inventory activities are focused on evaluating progress toward objectives, and the role of the Refuge in fish spawning is better understood. Increased monitoring leads to control of exotic species at more specific levels. Dikes and facilities are maintained at the current standards. Public appreciation for the Refuge increases because of increased access for wildlife observation and additional environmental education and interpretive programs. Higher quality experiences occur on the Refuge because disturbance from airboats is reduced. Refuge visitors and neighbors perceive increased safety and compliance with regulations because of increased visibility of law enforcement officers. The Refuge serves as floodwater storage when consistent with wetland management plans. Cultural diversity efforts are expanded through increased contacts. The activities of the Partners for Wildlife program are documented in GIS and charted annually. Conservation easements are inspected according to Service standards. Under increased funding, expanded facilities are better maintained. The public reports improved maintenance, but still sees need for improvement.

Alternative D–Intensive Management

Under this alternative, the enhancements of alternative C are increased further. Public appreciation and perception of the Refuge and its resources are maximized. Monitoring is intensified, because increased use would mean potential for increased impacts and the effects would need to be closely monitored. Under this alternative, existing wildlife diversity and abundance are enhanced, particularly for forest interior species. Deposition of silt on the Refuge is reduced. Monitoring and inventory activities are focused on evaluating progress toward objectives, and the role of the Refuge in fish spawning is better understood. Increased monitoring leads to control of exotic species at lower levels. Dikes and facilities are maintained at high standards. Public appreciation for the Refuge increases because of increased access for wildlife observation and additional environmental education and interpretive programs. Higher quality experiences occur on the Refuge because disturbance from airboats is reduced. Refuge visitors and neighbors perceive increased safety and compliance with regulations because of increased visibility of law enforcement officers. The Refuge serves as floodwater storage when consistent with wetland management plans. Cultural diversity efforts are expanded through greatly increased contacts. The activities of the Partners for Wildlife program are documented in GIS and charted annually. Conservation easements are inspected according to Service standards. Because this alternative requires increased funding and the probability of increased funding is low, the likelihood of achieving full success under this alternative is low.

Chapter 5

During initial planning, Refuge staff asked Refuge neighbors, organizations, local government units, schools, and interested citizens to share their thoughts in a series of open houses and focus groups. Forty-two people attended open houses at Bridgeport Township, Thomas Township, and at the Green Point Environmental Learning Center. Another 25 people participated in focus groups representing environmental education, cooperative farming, hunting and fishing, and wildlife observation/photography use of the Shiawassee National Wildlife Refuge. Service staff accepted oral and written comments at each open house and written comments were received in the mail after each open house. Refuge staff also consulted with local agency representatives and individuals during scoping. A draft environmental assessment and comprehensive conservation plan were sent to officials, agencies, organizations, and individuals seeking comment and input.

Chapter 6

The individuals who were primarily responsible for writing and editing the EA include:

Douglas G. Spencer, *Refuge Manager, Shiawassee National Wildlife Refuge*
Mr. Spencer provided overall direction, supervision, and coordination with agencies and the public. He assisted in writing and editing.

John H. Schomaker, *Refuge Planning Specialist, Region 3*
Mr. Schomaker provided coordination and served as co-author.

Judy McClendon, *Project Leader, Southern Missouri Ascertainment Office, Region 3*
Ms. McClendon wrote the initial draft of the environmental assessment.

Jane Hodgins, *Technical Writer/Editor, Region 3*
Ms. Hodgins served as primary editor.

Chapter 7

List of Agencies and Persons Consulted; see Appendix H.

Chapter 8

Literature Cited; see Appendix G.

Table 2: Summary of Actions Proposed Under Management Alternatives

Topic	Alternative A Current Mgmt. (No Action)	Alternative B Historical Vegetation Mgmt.	Alternative C Expanded Mgmt. (Preferred)	Alternative D Intensive Mgmt.
Habitat	Current mix of habitat would continue.	Habitat would be allowed to revert to the presettlement vegetation pattern. Croplands would be eliminated. Acreage of wetlands, forests and grasslands would increase, with greatest percentage increase in grassland.	The current mix of habitat would be altered in the short-term by changing 350 acres of cropland to moist soil management. Selective cutting within forests would increase the diversity of forests.	Same as Alternative C with increased intensive management of forest, wetland and grasslands.
Public Use	Access would consist of two hiking trails, an annual auto tour, deer and goose hunts. Bank fishing would be prohibited. Environmental education and interpretive programs would be offered at Green Point Learning Center.	Public use activities would continue as in Alt. A. Access might be more limited in the main body of the Refuge as dikes would not be maintained and some trail and tour routes would disappear. Environmental education and interpretation would be the same as Alt. A.	In addition to access detailed in Alt. A, one trail would be developed along the Tittabawassee River, three bank fishing areas would be provided, an auto tour route would be open 6 months of the year, and expanded education and interpretive programs would be offered along with education resources.	Same as Alt. C with additional opportunities for environmental education and interpretive programs, enhanced wildlife viewing opportunities and more auto tour opportunities.
Resource Protection	The current level of activities in law enforcement, control of exotics, and environmental monitoring would continue.	Same as Alt. A.	Law enforcement patrols would be increased, activities off the Refuge would target reducing silt deposition on the Refuge, exotics would be controlled at the current level, and environmental monitoring would increase to measure effects of management.	Same as Alt. C, with expanded activities in the control of exotics and monitoring.
Maintenance	Dike maintenance would continue as done presently.	Dikes would be maintained only to protect Refuge buildings and and to support trails and service roads.	Dike maintenance would continue as done presently.	Dikes would be maintained to a higher standard than they are at present.
General	Refuge funding would continue as in past with historical rate of increase. Cultural diversity efforts would continue at present levels and private land activities would occur as at present.	Same as Alt. A.	Funding and staff requests for Refuge would increase. Cultural diversity efforts would be increased proportionately to increased activity in env. education. Private land activities would be documented in GIS and monitored more than in Alt. A.	Funding and staff requests would exceed those of Alt. C. There would be greater efforts toward cultural diversity and private land monitoring than in Alt. C.

Table 3: Summary of Consequences Under Alternatives

Issues, Concerns & Opportunities	Alternative A Current Mgmt. (No Action)	Alternative B Historical Vegetation Mgmt.	Alternative C Expanded Mgmt. (Preferred)	Alternative D Intensive Mgmt.
Public Use				
Amount of public access to the refuge.	The refuge is primarily managed for wildlife, with wildlife-dependent public use allowed if determined compatible.	Public use would likely decrease due to less accessibility to flooded areas.	Public use/access would increase with more emphasis on expansion of interpretive and educational programs. Auto tour and horseback riding opportunities are increased from Alt. A.	Same or slightly higher than in Alt. C.
Airboat use affects wildlife and public use on the refuge.	Airboat use continues as present.	Same as in Alt. A.	Airboat use is controlled within authority determined by the Solicitor and in cooperation with other governmental entities.	Same as Alt. C.
Resource Protection Issues				
Enhanced law enforcement is needed.	Currently there are three collateral duty officers on the staff.	Same as in Alt. A.	Refuge visitors and neighbors see law enforcement officers more often. A full-time LE officer would be hired.	Same or slightly higher than Alt. C.
Sediment and chemical waste entering the refuge.	Current monitoring would not change.	Same as Alt. A.	Silt deposition reduced by 10 percent by the end of 15 years. Chemical monitoring as in Alt. A.	Silt deposition less than in Alt. C and chemical monitoring increased over other alternatives.
Control of exotic species.	Exotic species controlled according to Intgrated Pest Management Plan.	Same as Alt. A.	Quantitative monitoring increased over Alt. A and control instituted at more specific levels.	Invasion of species limited to lower limits than other alternatives.
Maintenance Issues				
Maintenance and repair of dikes.	Dikes are maintained with occasional delays in repairing in a timely manner.	Dikes are not maintained.	All dikes are maintained to current standards.	Dikes are maintained at a higher standared than in Alt. A.
Conserve areas of the refuge for floodwater storage.	Refuge serves as floodwater storage when consistent with wetland management plan.	Entire refuge, outside of building areas, would serve as natural floodplain.	Same as Alt. A.	Same as Alt. A

Table 3 Continued: Summary of Consequences Under Alternatives

Issues, Concerns & Opportunities	Alternative A Current Mgmt. (No Action)	Alternative B Historical Vegetation Mgmt.	Alternative C Expanded Mgmt. (Preferred)	Alternative D Intensive Mgmt.
General Issues				
Cultural diversity efforts fail to reach targeted communities.	Cultural diversity efforts continue to be focused on activities with the University of Michigan.	Same as Alt. A.	Greater numbers of culturally diverse populations are contacted and increased opportunities provided than in Alt. A.	Same as Alt. C with added contacts and opportunities.
Monitoring of Partners for Wildlife habitat restoration.	Activities are documented and maintained in files.	Same as Alt. A.	Activities are documented within GIS and charted annually.	Same as Alt. C.
Conservation Easements	Current limited activities continue.	Same as Alt. A.	Management meets Service standards.	Same as Alt. C.
Refuge funding of operations and maintenance.	Current level continues with public perception of situations that need attention and some maintenance completed with time delays.	Due to reduced needs of dike maintenance and redirected effort, other facilities are better maintained.	Due to RONS projects tied to the CCP, increased funding leads to expanded facilities and better maintenance than Alt. A. Public reports improved maintenance, but still sees needs.	Through optimized funding, public perception of a well maintained refuge.

Appendix B: Glossary

Appendix B: Glossary

Alternative	A set of objectives and strategies needed to achieve refuge goals and the desired future condition.
Biological Diversity	The variety of life forms and its processes, including the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur.
Compatible Use	A wildlife-dependent recreational use, or any other use on a refuge that will not materially interfere with or detract from the fulfillment of the mission of the Service or the purposes of the refuge.
Comprehensive Conservation Plan	A document that describes the desired future conditions of the refuge, and specifies management actions to achieve refuge goals and the mission of the National Wildlife Refuge System.
Ecosystem	A dynamic and interrelated complex of plant and animal communities and their associated non-living environment.
Ecosystem Approach	A strategy or plan to protect and restore the natural function, structure, and species composition of an ecosystem, recognizing that all components are interrelated.
Ecosystem Management	Management of an ecosystem that includes all ecological, social and economic components that make up the whole of the system.
Endangered Species	Any species of plant or animal defined through the Endangered Species Act as being in danger of extinction throughout all or a significant portion of its range, and published in the Federal Register.
Environmental Assessment	A systematic analysis to determine if proposed actions would result in a significant effect on the quality of the environment.
Extirpation	The local extinction of a species that is no longer found in a locality or country, but exists elsewhere in the world.

Goals	Descriptive statements of desired future conditions.
Interjurisdictional Fish	Fish that occur in waters under the jurisdiction of one or more states, for which there is an interstate fishery management plan or which migrates between the waters under the jurisdiction of two or more states bordering on the Great Lakes.
Issue	Any unsettled matter that requires a management decision. For example, a resource management problem, concern, a threat to natural resources, a conflict in uses, or in the presence of an undesirable resource condition.
National Wildlife Refuge System	All lands, waters, and interests therein administered by the U.S. Fish and Wildlife Service as wildlife refuges, wildlife ranges, wildlife management areas, waterfowl production areas, and other areas for the protection and conservation of fish, wildlife and plant resources.
Objectives	Actions to be accomplished to achieve a desired outcome.
Offset Levee	A levee set back from the original alignment of an existing levee (typically 3 feet to 5 feet setback).
Preferred Alternative	The Service's selected alternative identified in the Draft Comprehensive Conservation Plan.
Scoping	A process for determining the scope of issues to be addressed by a comprehensive conservation plan and for identifying the significant issues. Involved in the scoping process are federal, state and local agencies; private organizations; and individuals.
Species	A distinctive kind of plant or animal having distinguishable characteristics, and that can interbreed and produce young. A category of biological classification.
Strategies	A general approach or specific actions to achieve objectives.
Wildlife-dependent Recreational Use	A use of refuge that involves hunting, fishing, wildlife observation and photography, or environmental education and interpretation, as identified in the National Wildlife Refuge System Improvement Act of 1997.

Threatened Species	Those plant or animal species likely to become endangered species throughout all of or a significant portion of their range within the foreseeable future. A plant or animal identified and defined in accordance with the 1973 Endangered Species Act and published in the Federal Register.
Vegetation	Plants in general, or the sum total of the plant life in an area.
Vegetation Type	A category of land based on potential or existing dominant plan species of a particular area.
Watershed	The entire land area that collects and drains water into a stream or stream system.
Wetland	Areas such as lakes, marshes, and streams that are inundated by surface or ground water for a long enough period of time each year to support, and that do support under natural conditions, plants and animals that require saturated or seasonally saturated soils.
Wildlife Diversity	A measure of the number of wildlife species in an area and their relative abundance.

Appendix C: RONS and MMS Lists

Appendix C: RONS AND MMS

Refuge Operation Needs System List (RONS)
Maintenance Management System (MMS)

RONS Project Cost Summary – Refuge Project Priorities

The projects are prioritized into three categories based on the likelihood and potential impact of the project.

"A" Priority Projects

RONS Project No.	Strategy No.	Project Description	First Year Need	Recurring Annual Need
99005	1.11.1 and 2.5.2	Hire a full-time biological technician to monitor habitat	$114,000	$49,000
00001/00002	1.3.1 and 1.3.2	Improve Green Tree Reservoirs	$3,100,000	–
98005	1.5.1	Purchase 3-yard wheeled loader	$111,000	$6,000
98004	1.5.1	Purchase a trailer to haul heavy equipment	$164,000	$4,000
00013	2.3.1, 2.3.2, and 2.3.3	Fund study of Refuge fish productivity and recruitment	$174,000	$49,000
00010	3.2.1	Cass River, Woodland Trail, Green Point ELC, and Spaulding Drain bank fishing sites	$264,000	$16,000
97018	3.3.1	Auto tour route	$170,000	$10,000
00014	3.4.2, 3.5.2 and 3.6.1	Hire a refuge receptionist	$100,000	$42,000
98006	3.6.4	Expand curriculum	$22,000	–
98002	5.3.1	Add and support one full-time Refuge officer	$123,000	$58,000
98001	5.3.3	Purchase a vehicle and construct a storage facility for LE-related equipment	$118,000	$3,000
00011	5.4.1	Purchase water treatment system for maintenance facility	$6,000	$1,000
00006	5.3.4, 7.1.4	Add and support a seasonal law enforcement officer	$58,000	$25,000

RONS Project No.	Strategy No.	Project Description	First Year Need	Recurring Annual Need
"B" Priority Projects				
97017	1.3.2 and 1.4.1	Convert Deutz Engine into a trailer-mounted pump	$24,000	$2,000
97023	1.5.1, 1.7.2, 1.7.3	Purchase mulcher, mowers and seed drill	$78,000	$5,000
97017	1.5.1 and 1.5.2	Improve moist soil management capabilities	$27,000	$2,000
00015	1.5.4 and 1.7.1	Add one permanent seasonal tractor operator for trail and habitat maintenance	$55,000	$22,000
97017	1.6.2	Enhance emergent marsh management	$22,000	$2,000
00022	1.9.1	Conversion of wet farmlands to wetland habitats	$70,000	–
00018	3.2.3	Construct a boat landing and fishing access on the Tittabawassee River in Thomas Township	$200,000	–
00007	3.3.2	Expand trails	$95,000	$5,000
97003	3.4.3, 3.4.4	Addition of two Park Rangers	$257,000	$127,000
00023	3.4.5	Internship program	$100,000	$42,000
00008	3.4.7	Reestablish environmental education site	$55,000	$5,000
00009	6.1.1	Additional Private Lands biologist	$133,000	$68,000
00005	7.1.1	Complete legal surveys and boundary posting of easements	$200,000	–

RONS Project No.	Strategy No.	Project Description	First Year Need	Recurring Annual Need
"C" Priority Projects				
00019	1.1.1	Reforestation of large, unfragmented blocks	$350,000	–
00020	1.2.1 and 1.2.2	Development of multilayer forest	$100,000	–
00017	1.5.2	Subdivide MSU 1 into two units	$70.000	–
00016	1.7.4	Purchase a no-till grass drill to restore grasslands	$20,000	$2.000
00021	1.8.1	Manage croplands	$20,000	–
00004	3.5.1	Purchase an environmental education vehicle	$30,000	–
97021	4.1.2	Purchase and operate a travelers' information radio station	$24,000	$2,000
97022	4.1.5	Produce video on Great Lakes Ecosystem	$22,000	–
00003	5.2.1	Archaeological survey of Refuge land	$100,000	–

Maintenance Management System (MMS) List

Project Number	Project Description	Cost	Planned Funding Year
90111	Rehabilitate severely eroded Misteguay dike. The present dike has deteriorated to a point that it could wash out in the next major flood event. If this happens, both Refuge and private farmlands will be impacted by flood debris and siltation. (Title V LWCF)	$262,500	1999
00164	Replace worn-out 1970 Dodge stake bed truck. The truck has high mileage (100,300). It is no longer reliable and contantly breaks down, requiring extensive repairs. The truck is used in maintenance activities such as hauling materials and equipment.	$65,000	1999
00165	Replace deteriorated culvert and screw gate. The culvert is rusted through in some areas and the gate no longer operates smoothly. Total replacement of both items is required. The structure was installed in 1971 and has far exceeded its life expectancy. The structure is needed to manage water levels in Pool 2 for habitat control.	$18,000	1999
99000	Base Maintenance – This funding is used for routine maintenance of equipment and facilities.	$100,000	2000
96007	Replace worn-out radios. Regional Radio Coordinator is developing system diagrams for transition to Federal Land Mobile Radio Standard narrow-band equipment. Functional communications equipment is essential to employee safety.	$21,600	2001
90115	Replace deteriorated Bartel Road pump station 1. The pump station is needed to manage water levels for habitat manipulation in several impoundments. These impoundments are critical resting and feeding areas for migratory birds along the Shiawassee River.	$34,650	2001

Project Number	Project Description	Cost	Planned Funding Year
90113	Rehabilitate eroded Spaulding drain ditch slopes on the west side. The ditch embankment is being washed out each year by flood waters. This ditch embankment protects the Refuge pool habitat from silt-laden upstream flood waters.	$450,000	2001
97171	Repair eroded dikes on Pool 1B. Extensive erosion on the dikes is threatening water management capabilities. Interior slopes need to be repaired and reshaped, and erosion protection installed. This pool adjacent to the Shiawassee River is critical habitat for migratory birds.	$475,000	2001
96005	Clean out silted Trinklein Unit drainage ditches. Silt laded flood waters have deposited materials in the Trinklein ditch. This has severely impacted the ability to provide adequate drainage. This project will require hiring a contractor to remove the silt material from within the ditch and depositing it on the embankment slopes adjacent the ditch. Drainage is vital to the water management of the Refuge to maintain habitat and to provide consistent water levels for migrating birds.	$100,000	2002
99311	Resurface deteriorated public use parking areas and access roads. These gravel parking lots and roads have a lot of use and are deteriorated due to heavy traffic during wet conditions. The lots need to be regraded and regraveled.	$90,000	2002
90103	Repair erosion on Pools 1a/1b cross dikes. High water has caused erosion on the dike slopes. The dikes need to be reshaped and fill installed in eroded areas. Slope protection will also be installed. The dikes are needed to allow separate water level management of the pools.	$105,000	2003

Project Number	Project Description	Cost	Planned Funding Year
94239	Replace worn-out International tractor. The present tractor is becoming harder to repair because of age and the ability to locate replacement parts. Replacement is recommended. The tractor is used for habitat restoration and maintenance.	$42,000	2004
92201	Repair deteriorated trails and boardwalks at Green Point ELC. Work involves replacing surface boards at Green Point, applying stone to wet areas, clearing trees and brush and providing benches and signs. The public use this area within the city limits of Saginaw.	$30,000	2004
99436	Replace worn-out 1992 Chevrolet Blazer 4x4 truck. This truck is used extensively for law enforcement.	$30,000	2005
99437	Replace worn-out Dodge D150 pick-up truck. Truck is used extensively for maintenance and the station's biological programs.	$25,000	2005
99435	Replace worn-out 1977 Dodge pickup truck. The vehicle is used extensively by the station's public use specialist at Green Point ELC.	$25,000	2005
99434	Replace worn-out 1989 Dodge Ram pickup truck. This vehicle is used extensively for maintenance projects, for public use, and wetland management.	$25,000	2005
90108	Rehabilitate deteriorated roads, including the Ferguson Bayou nature trail, Evon Road, Houlihan Road, and Spaulding Drain Road. Driving surfaces need to be regraded and regraveled.	$200,000	2005
94238	Mower is used for dike and trail maint-enance. The mower deck is needed to keep trails in a usable condition. This involves the removal of unwanted tree and brush.	$18,000	2005

Project Number	Project Description	Cost	Planned Funding Year
99433	Replace 1979 dump truck. The truck is used to move heavy equipment and to haul materials to maintenance and construction sites.	$90,000	2005
90106	Repair and resurface the employee parking area. The parking area is badly eroded and has a drainage problem.	$60,585	
97170	Replace non-compliant oil storage building at the maintenance shop. The building does not meet federal and state standards for oil storage. A re-placement building is needed.	$7,000	
90116	Replace deteriorated culverts at various locations. The culverts are needed to move water through the Refuge and under roadways to prevent overtopping and erosion. This will protect structures and habitat.	$48,405	
90105	Repair erosion on Pool 4 dikes. The dikes are needed to provide water level management. Water management is needed to control woody vegetation and to enhance desirable habitat.	$309,750	
90119	Rehabilitate Houlihan Road farm drainage pump 1. The pump is needed to drain flood waters from agricultural fields. These fields provide a valuable food source for migrating birds and resident species.	$24,150	
92202	Replace worn-out Dodge W250 4x4 fire truck. The truck is used for fire suppression activities and on prescribed burns.	$34,650	
94237	Repair deficiences at the maintenance shop. Repair small items which, if left unattended, will cause bigger problems in the future. Roof replacement is the largest component of this project.	$30,000	
95429	Replace deteriorated storage building. The building is needed to store heavy equipment and materials indoors, secure from vandals and the weather.	$63,000	

Project Number	Project Description	Cost	Planned Funding Year
97167	Replace worn-out Case 580C backhoe. The present backhoe is getting beyond repair because of its age and condition.	$73,500	
90102	Rehabilitate Hart Marsh dikes. Repairs to the dikes are needed to allow continued management of the marsh. Water management is needed to control woody vegetation and to enhance desirable habitat.	$309,750	
90117	Replace deteriorated pump station in the Trinklein Unit. The pump station is needed to manage water levels for habitat management. This unit is an important resource along the Shiawassee River.	$54,495	
90118	Repair worn-out moist soil pump station 2. The pump station is needed to manage water levels for habitat management. This area along the Shiawassee River is heavily used by migratory birds.	$60,585	
92195	Replace worn-out 16-ton flat bed trailer. Loading ramps and electric breaks do not function properly. The trailer is needed to transport heavy equipment to various areas on the Refuge for maintenance projects.	$48,405	
92197	Replace worn-out JD440 tractor. The tractor is used for maintaining moist soil units and mowing trails and roadways.	$98,175	
90120	Repair Houlihan Road farm drainage pump 2. The pump is needed to drain flood waters from agricultural fields. These fields provide a valuable food resource for migrating birds and resident species.	$24,150	
97163	Repair eroded Pool 2 dike. Work will include embankment material, reshaping, and slope protection. The Pool 2 dike is needed to allow water management of a shallow pool that provides sanctuary for migratory birds along the Shiawassee River.	$147,830	

Appendix D: Compatibility Determinations

COMPATIBILITY DETERMINATION

Use: Hunting

Refuge Name: Shiawassee National Wildlife Refuge

Establishing and Acquisition Authority (ies): Established Oct. 21, 1953

Shiawassee National Wildlife Refuge was established as part of a dedicated wildlife area in the flood plain area of central Saginaw County. The area consisted of two units, the Shiawassee National Wildlife Refuge administered by the U.S. Fish and Wildlife Service and the Shiawassee River State Game Area administered by the Michigan Department of Natural Resources. Establishment of the Shiawassee Project was authorized by the Migratory Bird Conservation Commission in May of 1953.

Federal acquisition authorities used to acquire the federal portion of the dedicated wildlife area were the:

> Migratory Bird Conservation Act (16 U.S.C. , 714-714r)
> Refuge Recreation Act (16 U.S.C. , 460k-460k-4)

Funds for acquiring the Federal lands were primarily derived from Federal duck stamp sales. The state lands were acquired from Pittman-Robertson Act funds supplemented by state hunting license receipts.

Refuge Purpose(s): Shiawassee National Wildlife Refuge was established under the dual authorities listed above with the following purposes:

> ... for use as an inviolate sanctuary, or any other management purpose, for migratory birds."
>
> ... suitable for (1) incidental fish and wildlife oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered or threatened species...."

National Wildlife Refuge System Mission: The National Wildlife Refuge System mission is to administer a national network of lands and waters for the conservation, management and, where appropriate, restoration of the fish, wildlife and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Description of Use:

What is the use? Hunting of waterfowl and deer.

Where is the use conducted? Waterfowl hunting occurs along the periphery of the Refuge with 80 percent of the core acreage undisturbed. Waterfowl hunting may occur in newly acquired lands. The core acreage will remain undisturbed. Deer hunting may occur throughout the present Refuge and may be extended to acquired lands within the approved boundaries.

When is the use conducted? The use occurs during the fall and winter.

How is the use conducted? A master hunting plan describes when, where, and how we conduct our hunts. In addition, each year annual plans are submitted, reviewed, and approved with any changes to the program. All hunting activities are planned and operated with the Refuge's primary objectives, habitat management requirements, and goals as the guiding principles. All hunting activities follow applicable state laws, except where the Refuge administers further restrictions to ensure compatibility with the Refuge's primary mission. Hunting activities can only occur in designated areas listed in the hunter's permit and under the restrictions outlined in the same permit. Completing this activity under a hunting plan and special permits allows the Refuge to accomplish its management goals and provide needed safety levels for citizens of the area without adversely affecting Refuge habitats and wildlife populations.

Availability of Resources: Funds are available for managing this activity. Approximately $18,725 of staff time is required to administer and manage this activity. We estimate that an additional $1,000 is required for overhead expenses for a total estimated cost of $19,725 to administer the program. With $13,000 to $15,000 returned to the Refuge through user fees, final cost to the Refuge to administer these programs is $3,725 to $5,725. Based on a review of the Refuge budget allocated for this management activity, there is adequate funding to ensure compatibility and to administer and manage the use.

Anticipated Impacts Of Use: Continuing this activity has shown no assessable environmental impact to the Refuge, its habitats, or wildlife species. Concerns primarily center around the possibility of impacting threatened and other sensitive non-target species through excessive disturbance. With restrictions limiting access to specific locations, by motor boats along river channels, and non-motorized vehicles in other areas, disturbance is minimized. Disturbance to wildlife is limited to occasional flushing of non-target species and the harvest of individual members of the species open to the hunting season in the periphery areas only. Restrictions to the hunting program assure that these activities have no adverse impacts on other wildlife species and little adverse impact to other public use programs. The activities follow all applicable laws, regulations and policies; including Migratory Bird Conservation Act, 50 CFR, National Wildlife Refuge System Manual, National Wildlife Refuge System goals and objectives, and Shiawassee NWR goals and objectives. These activities are compliant with the purpose of the Refuge and the National Wildlife Refuge System Mission. Operating this activity does not alter the Refuge's ability to meet habitat goals, provides for the safety of local citizens, and supports several of the primary objectives of the Refuge.

Hunting is a priority public use listed in the National Wildlife Refuge System Improvement Act. By facilitating this use on the Refuge, we will increase visitors' knowledge and appreciation of wildlife, which will lead to increased public stewardship of wildlife and their habitats at the Refuge and in general. Increased public stewardship will support and complement the

Service's actions in achieving the Refuge's purposes and the mission of the National Wildlife Refuge System. In addition, deer hunting is necessary to meet the Refuge's habitat objectives and prevent adverse impacts to other wildlife species.

Public Review And Comment: This compatibility determination was part of the Draft Shiawassee National Wildlife Refuge Comprehensive Conservation Plan and Environmental Assessment, which was announced in the Federal Register and available for public comment for 30 days.

Determination (*check one below*):

_____Use is Not Compatible

___X__ Use is Compatible With the Following Stipulations

Stipulations Necessary To Ensure Compatibility: To ensure compatibility with National Wildlife Refuge System and Shiawassee NWR goals and objectives the activity can only occur under the following stipulations:

1. Ensure waterfowl hunting is limited to a maximum of 25 percent of all Refuge acreage and located in the periphery areas along the boundary of the Refuge.
2. All other hunting activities can only occur under a limited permit system to ensure disturbance to non-target species is minimized and activities are operated in a safe manner for the area's residents.
3. Annually review all hunting activities and operations to ensure compliance with all applicable laws, regulations and policies.
4. For acquired lands, legal access must exist for the public, all safety concerns must be addressed, and habitat must be appropriate for the game to be hunted.

Justification:

Waterfowl and deer hunting are compatible uses at Shiawassee National Wildlife Refuge. This determination was made as part of the environmental assessment associated with the comprehensive conservation planning process.

Signature: Refuge Manager: s/Douglas G. Spencer August 15, 2001
(signature and date)

Concurrence: Regional Chief: s/Tom Worthington (Acting) August 27, 2001
(signature and date)

Mandatory 10- or 15-year Re-evaluation Date: 2016

COMPATIBILITY DETERMINATION

Use: Fishing

Refuge Name: Shiawassee National Wildlife Refuge

Establishing and Acquisition Authority(ies): Established on Oct. 21, 1953

Shiawassee National Wildlife Refuge was established as part of a dedicated wildlife area in the flood plain area of central Saginaw County. The area consisted of two units, the Shiawassee National Wildlife Refuge administered by the U.S. Fish and Wildlife Service and the Shiawassee River State Game Area administered by the Michigan Department of Natural Resources. Establishment of the Shiawassee Project was authorized by the Migratory Bird Conservation Commission in May of 1953.

Federal acquisition authorities used to acquire the federal portion of the dedicated wildlife area were the:

> Migratory Bird Conservation Act (16 U.S.C. , 714-714r)
> Refuge Recreation Act (16 U.S.C. , 460k-460k-4)

Funds for acquiring the Federal lands were primarily derived from Federal duck stamp sales. The state lands were acquired from Pittman-Robertson Act funds supplemented by state hunting license receipts.

Refuge Purpose(s): Shiawassee National Wildlife Refuge was established under the dual authorities listed above with the following purposes:

> ... for use as an inviolate sanctuary, or any other management purpose, for migratory birds."
>
> ... suitable for (1) incidental fish and wildlife oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered or threatened species...."

National Wildlife Refuge System Mission: The National Wildlife Refuge System mission is to administer a national network of lands and waters for the conservation, management and, where appropriate, restoration of the fish, wildlife and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Description Of Use:

What is the use? Fishing

Where is the use conducted? Fishing is restricted to access along river channels. Most locations are limited to boat access; bank fishing along the river channels is permitted only in areas designated in the Comprehensive Conservation Plan. Fishing will be allowed on newly acquired lands that have legal public access, have historically provided public bank fishing, and can be safely fished without harm to the anglers and habitat. The Comprehensive Conservation Plan calls for establishing boat launch facilities. The boat

launches will facilitate access to the rivers of the Refuge and enhance fishing, wildlife observation, and photography opportunities.

When is the use conducted? The use occurs throughout the year according to State regulations.

How is the use conducted? A step-down fishing plan and the Refuge's Comprehensive Conservation Plan describe when, where, and how fishing is conducted. All fishing activities are planned and operated with the Refuge's primary objectives, habitat management requirements, and goals as the guiding principles. All fishing activities follow applicable state laws, except where the Refuge administers further restrictions to ensure compatibility with the Refuge's primary mission. Fishing is restricted to areas along river channels. Most locations are limited to boat access; bank fishing along the river channels is permitted only in areas designated in the Comprehensive Conservation Plan. Fishing under the above restrictions allows the Refuge to accomplish its management goals and provide for the safety of visitors.

Availability of Resources: Approximately $700 of staff time is required to administer and manage this activity. Overhead expenses associated with bank fishing are estimated to be $10,000 for a total estimated cost of $10,700. Overhead expenses associated with the development of boat launch facilities are estimated to be $250,000. Based on a review of the Refuge budget allocated for these activities, there is currently not enough funding to ensure compatibility and to administer and manage the use. This activity will only be permitted after funding sources have been identified to cover the overhead cost for the program.

Anticipated Impacts Of The Use: Fishing has shown no assessable environmental impact to the Refuge, its habitats, or wildlife species. Concerns primarily center around the possibility of impacting threatened and other sensitive non-target species through excessive disturbance. With restrictions limiting access to specific locations such as motor boats along river channels and walk-in trails to specific bank fishing sites in other areas, disturbance is minimized. Disturbance to wildlife is limited to occasional flushing of non-target species and the harvest of individual members of the species open to the recreational fishing. Restrictions on the size and operation of the boat launch facilities will assure minimal impacts on aesthetics on the river and disturbance to wildlife and other public use activities. Harvests are regulated to take only surplus specimens, thus assuring viable, healthy populations within management and habitat guidelines. Restrictions to the fishing program assure that these activities have no adverse impacts on other wildlife species and little adverse impact on other public use programs. The activities follow all applicable laws, regulations and policies; including Migratory Bird Conservation Act, 50 CFR, National Wildlife Refuge System Manual, National Wildlife Refuge System goals and objectives, and Shiawassee NWR goals and objectives. These activities are compliant with the purpose of the Refuge and the National Wildlife Refuge System Mission. Operating this activity does not alter the Refuge's ability to meet habitat goals and it helps support several of the primary objectives of the Refuge.

Fishing is a priority public use listed in the National Wildlife Refuge System Improvement Act. By facilitating this use on the Refuge, we will increase visitors' knowledge and appreciation of fish and wildlife, which will lead to increased public stewardship of fish and wildlife and their habitats at the Refuge and in general. Increased public stewardship will support and complement the Service's actions in achieving the Refuge's purposes and the mission of the National Wildlife Refuge System.

Public Review And Comment: This compatibility determination was part of the Draft Shiawassee National Wildlife Refuge Comprehensive Conservation Plan and Environmental Assessment, which was announced in the Federal Register and available for public comment for 30 days.

Determination (*Check one below*):

_____Use is Not Compatible

__X__Use is Compatible With the Following Stipulations

Stipulations Necessary To Ensure Compatibility: To ensure compatibility with National Wildlife Refuge System and Shiawassee NWR goals and objectives fishing can only occur under the following stipulations:

1. Fishing is permitted only in designated locations using specific routes for access, which will ensure minimal disturbance to wildlife and minimal impacts to their habitats.
2. All fishing activities and boat launch facilities are operated under state laws unless we place further restrictions on the activities to ensure compliance with all applicable laws, regulations and policies.
3. Boat launch facilities can only be constructed in designated locations using specific designs that follow Federal and state engineering plans.

Justification:

Fishing is a compatible use at Shiawassee National Wildlife Refuge. This determination was made as part of the environmental assessment associated with the comprehensive conservation planning process.

Signature: Refuge Manager: s/Douglas G. Spencer August 15, 2001
(signature and date)

Concurrence: Refuge Chief: s/Tom Worthington (Acting) August 27, 2001
(signature and date)

Mandatory 10- or 15-year Re-evaluation Date: 2016

COMPATIBILITY DETERMINATION

Use: Wildlife Observation and Photography

Refuge Name: Shiawassee National Wildlife Refuge

Establishing and Acquisition Authority(ies): Established on Oct. 21, 1953

Shiawassee National Wildlife Refuge was established as part of a dedicated wildlife area in the flood plain area of central Saginaw County. The area consisted of two units, the Shiawassee National Wildlife Refuge administered by the U.S. Fish and Wildlife Service and the Shiawassee River State Game Area administered by the Michigan Department of Natural Resources. Establishment of the Shiawassee Project was authorized by the Migratory Bird Conservation Commission in May of 1953.

Federal acquisition authorities used to acquire the federal portion of the dedicated wildlife area were the:

> Migratory Bird Conservation Act (16 U.S.C. , 714-714r)
> Refuge Recreation Act (16 U.S.C. , 460k-460k-4)

Funds for acquiring the Federal lands were primarily derived from Federal duck stamp sales. The state lands were acquired from Pittman-Robertson Act funds supplemented by state hunting license receipts.

Refuge Purpose(s): Shiawassee National Wildlife Refuge was established under the dual authorities listed above with the following purposes:

> ... for use as an inviolate sanctuary, or any other management purpose, for migratory birds."
>
> ... suitable for (1) incidental fish and wildlife oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered or threatened species...."

National Wildlife Refuge System Mission: The National Wildlife Refuge System mission is to administer a national network of lands and waters for the conservation, management and, where appropriate, restoration of the fish, wildlife and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Description of Use:

What is the use? Wildlife observation and photography

Where is the use conducted? Currently, wildlife observation and photography occurs along and near trails of the Refuge and at observation towers and decks. One September weekend a year an auto tour route is opened to the public. The CCP calls for extending the Woodland Trail along the Tittabawassee River and developing a new trail along the Cass River. The CCP also call for developing an auto tour route along existing Refuge roads.

The proposed Great Lakes Discovery Center in Bridgeport will also provide additional trails and auto tour.

When is the use conducted? The use occurs year-round and is dependent on access.

How is the use conducted? Access for wildlife observation and photography is gained through hiking, bicycling, and cross-country skiing on designated trails and by automobile on a designated tour route. Bicyclers are encouraged not to ride their bicycles on the trails at Green Point Environmental Learning Center due to potential conflicts with educational activities. The new auto tour route will be open during designated hours from late spring through summer, depending on wildlife use and road conditions.

Availability of Resources: Based on a review of the Refuge budget allocated for this activity, there is adequate funding to ensure compatibility and to administer and manage the use at its current level. Approximately $2,500 of staff time and $500 of overhead is required to administer this use. Expanding the trail system has been submitted for funding within the Refuge Operating Needs System–$95,000 for development and $8,000 for annual maintenance. Establishing the auto tour route has been submitted for funding within the Refuge Operating Needs System–$170,000 for development and $10,000 for annual maintenance. We anticipate that $1,300 of additional staff time and $500 of additional overhead will be required to manage the expanded trails and auto tour.

Anticipated Impacts of Use: Anticipated impacts from visitors engaged in wildlife observation and photography are minor damage to vegetation, littering, increased maintenance activity, potential conflicts with other visitors, and minor disturbances to wildlife. Because visitors are limited to designated trail access and time limitations may be imposed, wildlife observation and photography has only minor impacts on wildlife and does not detract from the primary purposes of the Refuge. All other potential impacts are considered minor.

Wildlife observation and photography are priority public uses listed in the National Wildlife Refuge System Improvement Act. By facilitating these uses on the Refuge, we will increase visitors' knowledge and appreciation of fish and wildlife, which will lead to increased public stewardship of wildlife and their habitats at the Refuge and in general. Increased public stewardship will support and complement the Service's actions in achieving the Refuge's purposes and the mission of the National Wildlife Refuge System.

Public Review And Comment: This compatibility determination was part of the Draft Shiawassee National Wildlife Refuge Comprehensive Conservation Plan and Environmental Assessment, which was announced in the Federal Register and available for public comment for 30 days.

Determination (*Check one below*):

_____Use is Not Compatible

__X__ Use is Compatible With the Following Stipulations

Stipulations Necessary To Ensure Compatibility:

Public access for wildlife observation and photography will be limited to designated areas and with time restrictions to assure minimal disturbance to wildlife and minimal conflict between user groups. Wildlife observation and photography activities will be reviewed annually to ensure this compatibility determination still applies.

Justification:

Wildlife observation and photography is a compatible use at Shiawassee National Wildlife Refuge. This determination was made as part of the environmental assessment associated with the comprehensive conservation planning process.

Signature: Refuge Manager: s/Douglas G. Spencer August 15, 2001
(signature and date)

Concurrence: Regional Chief: s/Tom Worthington (Acting) August 27, 2001
(signature and date)

Mandatory 10- or 15-year Re-evaluation Date: 2016

COMPATIBILITY DETERMINATION

Use: Environmental Education and Interpretation

Refuge Name: Shiawassee National Wildlife Refuge

Establishing and Acquisition Authority(ies): Established on Oct. 21, 1953

Shiawassee National Wildlife Refuge was established as part of a dedicated wildlife area in the flood plain area of central Saginaw County. The area consisted of two units, the Shiawassee National Wildlife Refuge administered by the U.S. Fish and Wildlife Service and the Shiawassee River State Game Area administered by the Michigan Department of Natural Resources. Establishment of the Shiawassee Project was authorized by the Migratory Bird Conservation Commission in May of 1953.

Federal acquisition authorities used to acquire the federal portion of the dedicated wildlife area were the:

> Migratory Bird Conservation Act (16 U.S.C. , 714-714r)
> Refuge Recreation Act (16 U.S.C. , 460k-460k-4)

Funds for acquiring the Federal lands were primarily derived from Federal duck stamp sales. The state lands were acquired from Pittman-Robertson Act funds supplemented by state hunting license receipts.

Refuge Purpose(s): Shiawassee National Wildlife Refuge was established under the dual authorities listed above with the following purposes:

> ... for use as an inviolate sanctuary, or any other management purpose, for migratory birds."
>
> ... suitable for (1) incidental fish and wildlife oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered or threatened species...."

National Wildlife Refuge System Mission: The National Wildlife Refuge System mission is to administer a national network of lands and waters for the conservation, management and, where appropriate, restoration of the fish, wildlife and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Description of Use:

What is the use? Environmental education consists of activities conducted by Refuge staff, volunteers, and teachers. Interpretation occurs in less formal activities with Refuge staff and volunteers or through exhibits, signs, and brochures.

Where is the use conducted? Currently, environmental education and interpretation are conducted at the Green Point Environmental Learning Center and along and near trails of the Refuge. The CCP calls for establishing an

environmental education site nearer the core of the Refuge. The facilities at the site will consist of restrooms, shelter, and picnic tables. These facilities will permit school groups to maximize their time at the Refuge in environmental education activities during a limited school day. The proposed Great Lakes Discovery Center in Bridgeport will also provide additional facilities for environmental education and interpretation. The remainder of the Refuge serves as a sanctuary for wildlife.

When is the use conducted? The use occurs year-round with peak use in the spring and fall for environmental education.

How is the use conducted? Environmental education activities on the Refuge are led by Refuge staff, volunteers, or teachers, who have been oriented to appropriate use on the Refuge. Students are guided through their activities with adult supervision. Interpretive programs are led by Refuge staff and volunteers. Interpretive materials are developed and placed by Refuge staff.

Availability of Resources: Based on a review of the Refuge budget allocated for this activity, there is adequate funding to ensure compatibility and to administer and manage the use at its current level. Approximately $34,000 of staff time and $6,000 of overhead is required to administer this use. Reestablishing the environmental education site in the core of the Refuge has been submitted for funding within the Refuge Operating Needs System--$55,000 for development and $5,000 for annual maintenance. Expanding environmental education and interpretation at Green Point Environmental Learning Center will cost approximately $520,000, which will be covered by the Natural Resource Damage Assessment award as outlined in the CCP.

Anticipated Impacts of Use: Anticipated impacts from environmental education and interpretation are minor damage to vegetation, littering, possible conflict with other users, and increased maintenance activity. Minor disturbances to wildlife were considered during planning. Space and time limitations placed on environmental education and interpretation assure that this activity has only minor impacts on wildlife and does not detract from the primary purposes of the Refuge.

Environmental education is a priority public use listed in the National Wildlife Refuge System Improvement Act. By facilitating environmental education on the Refuge, we will increase knowledge and appreciation of fish and wildlife among program participants, which will lead to increased public stewardship of wildlife and their habitats at the Refuge and in general. Increased public stewardship will support and complement the Service's actions in achieving the Refuge's purposes and the mission of the National Wildlife Refuge System.

Public Review And Comment: This compatibility determination was part of the Draft Shiawassee National Wildlife Refuge Comprehensive Conservation Plan and Environmental Assessment, which was announced in the Federal Register and available for public comment for 30 days.

Determination (*check one below*):

_____Use is Not Compatible

__X__ Use is Compatible With the Following Stipulations

Stipulations Necessary To Ensure Compatibility:

Environmental education will only occur in developed areas designated by the CCP or under the guidance of a Refuge staff member, volunteer, or trained teacher to assure minimal disturbance to wildlife, minimal vegetation damage, and minimal conflict between user groups. Environmental education activities will be reviewed annually to ensure this compatibility determination still applies.

Justification:

Environmental education is a compatible use at Shiawassee National Wildlife Refuge. This determination was made as part of the environmental assessment associated with the comprehensive conservation planning process.

Signature: Refuge Manager: s/Douglas G. Spencer August 15, 2001
(signature and date)

Concurrence: Regional Chief: s/Tom Worthington (Acting) August 27, 2001
(signature and date)

Mandatory 10- or 15-year Re-evaluation Date: 2016

COMPATIBILITY DETERMINATION

Use: Permitted Archeological Investigations

Refuge Name: Shiawassee National Wildlife Refuge

Establishing and Acquisition Authority(ies): Established on Oct. 21, 1953

Shiawassee National Wildlife Refuge was established as part of a dedicated wildlife area in the flood plain area of central Saginaw County. The area consisted of two units, the Shiawassee National Wildlife Refuge administered by the U.S. Fish and Wildlife Service and the Shiawassee River State Game Area administered by the Michigan Department of Natural Resources. Establishment of the Shiawassee Project was authorized by the Migratory Bird Conservation Commission in May of 1953.

Federal acquisition authorities used to acquire the federal portion of the dedicated wildlife area were the:

> Migratory Bird Conservation Act (16 U.S.C. , 714-714r)
> Refuge Recreation Act (16 U.S.C. , 460k-460k-4)

Funds for acquiring the Federal lands were primarily derived from Federal duck stamp sales. The state lands were acquired from Pittman-Robertson Act funds supplemented by state hunting license receipts.

Refuge Purpose(s): Shiawassee National Wildlife Refuge was established under the dual authorities listed above with the following purposes:

> ... for use as an inviolate sanctuary, or any other management purpose, for migratory birds."
>
> ... suitable for (1) incidental fish and wildlife oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered or threatened species...."

National Wildlife Refuge System Mission: The National Wildlife Refuge System mission is to administer a national network of lands and waters for the conservation, management and, where appropriate, restoration of the fish, wildlife and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Description of Use:

What is the use? Permitted Archeological Investigations--Permitted archeological investigations are those requested by archeologists who are not performing the investigation for Refuge management purposes (e.g., not for Section 106 of the National Historic Preservation Act).

Where is the use conducted? Permits can be for anyplace on FWS owned and managed lands, but each permit is for specific lands.

When is the use conducted? The use can occur throughout the year.

How is the use conducted? Archeologists request Archaeological Resources Protection Act (ARPA) permits or Antiquities Act permits to conduct "Surveys, limited testing and/or limited collections on lands identified" and "Excavation, collection and intensive study of specific sites described" on Refuge land. Permits are issued by the Regional Director to qualified archeologists when the Refuge Manager determines the investigation will not interfere with Refuge programs.

Availability of Resources: A small amount of staff time will be required infrequently to administer and manage this activity. There is no associated overhead expense. Based on a review of the Refuge budget, there is adequate funding to ensure compatibility and to administer and manage the use.

Anticipated Impacts of the Use: Permitted archeological investigations result in minimal impacts to habitat and wildlife resources. The ground disturbance, however, can be minimal for small scale surface surveys to extensively disruptive for large scale excavations.

The archeological investigations would be conducted in the public interest for which Federal agencies protect archeological sites; and the results may be included in public interpretive exhibits and other public dissemination. The results of the study could increase Refuge understanding of prior human activities on the Refuge and could be part of Refuge interpretive programs.

Public Review And Comment: This compatibility determination was part of the Draft Shiawassee National Wildlife Refuge Comprehensive Conservation Plan and Environmental Assessment, which was announced in the Federal Register and available for public comment for 30 days.

Determination (*check one below*):

_____Use is Not Compatible

__X__Use is Compatible With the Following Stipulations

Stipulations Necessary To Ensure Compatibility: Applicant must obtain a Special Use Permit issued by the Refuge Manager. No special stipulations are necessary to ensure compatibility. The Refuge Manager will issue a Special Use Permit that might have administrative or management stipulations.

Predetermined stipulations on ARPA/Antiquities permits and the requirements in 43 CFR Part 7, "Protection of Archaeological Resources: Uniform Regulations," require land restoration and other protective measures by archeologists.

Justification:

Permitted Archeological Investigations are a compatible use at Shiawassee National Wildlife Refuge. This determination was made as part of the environmental assessment associated with the comprehensive conservation planning process.

Signature: Refuge Manager: s/Douglas G. Spencer August 15, 2001
(signature and date)

Concurrence: Regional Chief: s/Tom Worthington (Acting) August 27, 2001
(signature and date)

Mandatory 10- to 15-year Re-evaluation Date: 2016

COMPATIBILITY DETERMINATION

Use: Farming

Refuge Name: Shiawassee National Wildlife Refuge

Establishing and Acquisition Authority(ies): Established on Oct. 21, 1953

Shiawassee National Wildlife Refuge was established as part of a dedicated wildlife area in the flood plain area of central Saginaw County. The area consisted of two units, the Shiawassee National Wildlife Refuge administered by the U.S. Fish and Wildlife Service and the Shiawassee River State Game Area administered by the Michigan Department of Natural Resources. Establishment of the Shiawassee Project was authorized by the Migratory Bird Conservation Commission in May of 1953.

Federal acquisition authorities used to acquire the federal portion of the dedicated wildlife area were the:

> Migratory Bird Conservation Act (16 U.S.C. , 714-714r)
> Refuge Recreation Act (16 U.S.C. , 460k-460k-4)

Funds for acquiring the Federal lands were primarily derived from Federal duck stamp sales. The state lands were acquired from Pittman-Robertson Act funds supplemented by state hunting license receipts.

Refuge Purpose(s): Shiawassee National Wildlife Refuge was established under the dual authorities listed above with the following purposes:

> ... for use as an inviolate sanctuary, or any other management purpose, for migratory birds."
>
> ... suitable for (1) incidental fish and wildlife oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered or threatened species...."

National Wildlife Refuge System Mission: The National Wildlife Refuge System mission is to administer a national network of lands and waters for the conservation, management and, where appropriate, restoration of the fish, wildlife and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Description of Use:

What is the use? Farming

Where is the use conducted? Farming occurs on 1,182 acres in the Refuge. The location of the croplands are depicted in Figure 4.1 of the Comprehensive Conservation Plan.

When is the use conducted? The use occurs throughout the year.

How is the use conducted? Farming occurs under a cooperative agreement, which is reviewed and signed annually. The agreement requires the cooperator to provide all the necessary agricultural equipment, supplies, and manpower to raise and harvest designated crops. The Refuge provides only the land needed for the program and oversight in the administration and operation of the program. The Refuge receives 30 percent of the yield of the designated crops. Land tracts designated for farming, crop rotations, farming techniques, and special restrictions are detailed in the cooperative agreement and are guided by the habitat and wildlife needs of the Refuge.

Availability of Resources: Approximately $2,192.00 of staff time is required to administer and manage this activity. We estimate that an additional $300.00 is required for overhead costs, for a total estimated cost of $2,492.00. Based on a review of the Refuge budget, there is adequate funding to ensure compatibility and to administer and manage the use.

Anticipated Impacts of the Use: Continuing this activity has shown no assessable environmental impact to the Refuge, its habitats or wildlife species. The activity is currently compliant with the purpose of the Refuge and the National Wildlife Refuge System Mission. The activity follows all applicable laws, regulations and policies; including Migratory Bird Conservation Act, Refuge Recreation Act, 50 CFR, National Wildlife Refuge System Manual, National Wildlife Refuge System goals and objectives, and Shiawassee NWR goals and objectives. This land use activity is tied to Refuge objectives by providing for the maintenance of migratory waterfowl and offering recreational opportunities to the general public. The program is also used to periodically rejuvenate moist soil units, set back plant succession and prevent encroachment of invasive species in some units. Each participant in this program must sign a cooperative agreement which has progressively moved operations away from conventional styles to sustainable agriculture; more beneficial to the environment and wildlife. Examples include prohibiting the use of insecticides, crop rotations developed to reduce the insect and weed problems, the development of grass buffer strips to reduce runoff, use of legumes to increase soil fertility, special guidelines on fall plowing to reduce soil erosion, crop scouting to reduce the dependance on commercial herbicides and fertilizers, and using only pre-approved herbicides from the Refuge list found to be less toxic to non-target species, the environment, and wildlife. Operating this activity does not alter the Refuge's ability to meet habitat goals and objectives.

This program supports a number of Refuge goals and objectives. It supports a blend of habitat types in prime condition that emphasizes the primary mission of the Refuge – migratory waterfowl and their distribution objectives. It also contributes to the Service's mission of maintaining and restoring a optimum blend of nesting, feeding, and loafing habitats for migratory birds. Lastly, it assists in the Refuge efforts to provide a goose hunting program, a wildlife-dependent opportunity that encourages appreciation of wildlife and the Refuge. Farming under a cooperative agreement allows the Refuge to accomplish its management goals without overburdening the time and energy of our personnel.

Public Review And Comment: This compatibility determination was part of the Draft Shiawassee National Wildlife Refuge Comprehensive Conservation Plan and Environmental Assessment, which was announced in the Federal Register and available for public comment for 30 days.

Determination (*check one below*):

_____Use is Not Compatible

__X__Use is Compatible With the Following Stipulations

Stipulations Necessary To Ensure Compatibility:

To ensure compatibility with National Wildlife Refuge System and Shiawassee NWR goals and objectives the activity can only occur under the following stipulations:

1. Activities are to occur on no more than 1,182 acres of the Refuge each year and in areas designated under the agreement.
2. All operations are to be carried out under cooperative agreements encouraging sustainable agricultural practices.
3. Cooperative agreement guidelines are to be reviewed each year to ensure compatibility and the maximum benefit for wildlife using the Refuge.
4. Sellers will be given a 2-year option to continue to farm lands that are acquired within the expansion area. The 2-year option lands will not be included in the 1,182-acre total.
5. Cooperative farmers will be encouraged to move from the wet, core area of the Refuge to acquired lands only if the acquired lands meet the following conditions: the land is presently in crops; the cropland is more than 1,000 feet from any river channel; the cropland does not flood more than once a year; and the seller of the land has been given the option to farm the land for 2 years.

Justification:

Farming is a compatible use at Shiawassee National Wildlife Refuge. This determination was made as part of the environmental assessment associated with the comprehensive conservation planning process.

Signature: Refuge Manager: s/Douglas G. Spencer August 15, 2001
(signature and date)

Concurrence: Regional Chief: s/Tom Worthington (Acting) August 27, 2001
(signature and date)

Mandatory 10- or 15-year Re-evaluation Date: 2016

COMPATIBILITY DETERMINATION

Use: Firewood Cutting

Refuge Name: Shiawassee National Wildlife Refuge

Establishing and Acquisition Authority(ies): Established on Oct. 21, 1953

Shiawassee National Wildlife Refuge was established as part of a dedicated wildlife area in the flood plain area of central Saginaw County. The area consisted of two units, the Shiawassee National Wildlife Refuge administered by the U.S. Fish and Wildlife Service and the Shiawassee River State Game Area administered by the Michigan Department of Natural Resources. Establishment of the Shiawassee Project was authorized by the Migratory Bird Conservation Commission in May of 1953.

Federal acquisition authorities used to acquire the federal portion of the dedicated wildlife area were the:

> Migratory Bird Conservation Act (16 U.S.C. , 714-714r)
> Refuge Recreation Act (16 U.S.C. , 460k-460k-4)

Funds for acquiring the Federal lands were primarily derived from Federal duck stamp sales. The state lands were acquired from Pittman-Robertson Act funds supplemented by state hunting license receipts.

Refuge Purpose(s): Shiawassee National Wildlife Refuge was established under the dual authorities listed above with the following purposes:

> ... for use as an inviolate sanctuary, or any other management purpose, for migratory birds."
>
> ... suitable for (1) incidental fish and wildlife oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered or threatened species...."

National Wildlife Refuge System Mission: The National Wildlife Refuge System mission is to administer a national network of lands and waters for the conservation, management and, where appropriate, restoration of the fish, wildlife and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Description of Use:

What is the use? Firewood Cutting

Where is the use conducted? This activity is usually restricted to brushing and trimming road edges, limbing individual trees, selective cutting of forested lands for habitat improvements, and removal of trees that create a safety hazard to the general public or Refuge staff.

When is the use conducted? The use occurs primarily in the winter when the ground is hard.

The use may be permitted in the summer during dry periods.

How is the use conducted? A special use permit specifies when, where, and how firewood cutting will be conducted. Firewood cutting occurs only in areas designated in the special use permit and when needed as a necessary habitat or maintenance function.

Availability of Resources: Approximately $116 of staff time is required to administer and manage this activity. There is no overhead expense associated with this activity. Based on a review of the Refuge budget, there is adequate funding to ensure compatibility and to administer and manage the use.

Anticipated Impacts of the Use: Continuing this activity would have no assessable environmental impact to the Refuge, its habitats or wildlife species. The activity is also compliant with the purpose of the Refuge and the National Wildlife Refuge System Mission. The activity follows all applicable laws, regulations and policies; including Migratory Bird Conservation Act, Refuge Recreation Act, 50 CFR, National Wildlife Refuge System Manual, National Wildlife Refuge System mission, and Shiawassee NWR goals and objectives.

Conducting firewood cutting under a special use permit allows the Refuge to reduce the time and energy burden on maintenance personnel, achieve needed facility maintenance, and meet habitat goals and objectives.

Public Review And Comment: This compatibility determination was part of the Draft Shiawassee National Wildlife Refuge Comprehensive Conservation Plan and Environmental Assessment, which was announced in the Federal Register and available for public comment for 30 days.

Determination (*check one below*):

_____Use is Not Compatible

__X__Use is Compatible With the Following Stipulations

Stipulations Necessary To Ensure Compatibility: To ensure compatibility with National Wildlife Refuge System and Shiawassee NWR goals and objectives firewood cutting can only occur under the following stipulations:

1. Activities are to occur only under a special use permit and in areas designated by the permit.
2. Activities can only occur when needed as a necessary habitat and facility maintenance function.

Justification:

Firewood cutting is a compatible use at Shiawassee National Wildlife Refuge. This determination was made as part of the environmental assessment associated with the comprehensive conservation planning process.

Signature: Refuge Manager: s/Douglas G. Spencer August 15, 2001
(signature and date)

Concurrence: Regional Chief: s/Tom Worthington (Acting) August 27, 2001
(signature and date)

Mandatory 10- or 15-year Re-evaluation Date: 2016

Appendix E: Species List

Flora of Shiawassee National Wildlife Refuge

Documented list revised May 2001

Aceraceae: **Maple Family**
- *Acer negunda* L. – Box Elder
- *Acer rubrum* L. – Red Maple
- *Acer saccharinum* L. – Silver Maple

Alismataceae: **Water-plantain Family**
- *Alisma plantago-aquatica* L. – Water-plantain

Amaranthaceae: **Amaranth Family**
- *Amaranthus tuberculatus* (Moq.) Sauer – Amaranth sp.

Anacardiaceae: **Cashew Family**
- *Rhus typhina* L. – Staghorn Sumac
- *Toxicodendron radicans* (L.) Kuntze – Poison Ivy

Apocynaceae: **Dogbane Family**
- *Apocynum androsaemifolium* L. – Spreading Dogbane
- *Apocynum cannabinum* L. – Indian Hemp

Araceae: **Arum Family**
- *Arisaema dracontium* (L.) Schott – Green Dragon
- *Arisaema triphyllum* L. – Jack-In-the-Pulpit
- *Peltandra virginica* L. – Arrow-arum

Aristolochiaceae: **Birthwort Family**
- *Asarum canadense* L. –Wild Ginger

Asclepiadaceae: **Milkweed Family**
- *Asclepias incarnata* L. – Swamp Milkweed
- *Asclepias syriaca* L. – Common Milkweed

Balsaminaceae: **Touch-me-not Family**
- *Impatiens capensis* Meerb. – Spotted Jewelweed

Berberidaceae: **Barberry Family**
- *Berberis thunbergii DC.* – Japanese Barberry
- *Podophyllum peltatum* L. May – Apple

Betulaceae: **Birch Family**
- *Betula papyrifera Marsh* – Paper, River or Canoe Birch
- *Carpinus caroliniana* Walter Hornbeam; Blue beech, Musclewood

Campanulaceae: **Bellflower Family**
- *Campanula americana* L. – Tall Bellflower
- *Lobelia cardinalis* L. – Cardinal flower
- *Lobelia siphilitica* L. – Great Blue Lobelia

Caprifoliaceae: **Honeysuckle Family**
- *Lonicera tatarica* L. – Tartarian Honeysuckle
- *Sambucus canadensis* L. – Common Elderberry
- *Viburnum lentago* L. – Nannyberry
- *Viburnum opulus* L. – Guelder-rose, High-bush Cranberry

Caryophyllaceae: **Pink Family**
- *Dianthus armeria* L. – Deptford Pink
- *Silene vulgaris* Moench Garcke – Bladder-Campion

Celastraceae: **Bittersweet Family**
- *Euonymus atropurpurea* Jacq. – Eastern Wahoo, Burning Bush

Chenopodiaceae: **Goosefoot Family**

Chenopodium album L. – Lamb's-Quarters, "Pigweed"

Compositae (Asteraceae): **Aster or Daisy Family**

Achillea millefolium L. – Common Yarrow
Anthemis cotula L. – Mayweed: Dog fennel; Stinking Chamomile
Ambrosia artemisiifolia L. – Common Ragweed
Arctium minus Bernh. – Common Burdock
Aster ericoides L. – White Prairie Aster
Aster macrophyllus L. – Large-leaved Aster
Aster novae-angliae L. – New England Aster
Bidens cemua L. – Bur Marigold
Bidens comosus (Gray)Wiegand – Beggartick sp.
Bidens vulgatus f. puberula (Wiegand) – Beggartick sp.
Chrysanthemum leucanthemum L. – Ox-Eye Daisy
Cirsium arvense L. – Canada Thistle
Cichorium intybus L. – Chicory, Blue-sailors
Cirsium vulgare (Savi)Tenore – Bull Thistle
Conyza canadensis (L.) Cronquist – Horseweed
Erigeron strigosus Willd. – Fleabane
Eupatorium maculatum L. – Joe-Pye Weed
Eupatorium rugosum Houtt. – White Snakeroot
Gnaphalium uliginosum L. – Low Cudweed
Helenium autumnale L. – Sneezeweed
Hieracium aurantiacum L. – Orange Hawkweed
Hieracium kieracium piloselloides Vill.– Smoothish Hawkweed; King Devil; Yellow Hawkweed
Lactuca scariola L. – Prickly Lettuce
Matricaria discoidea DC. – Pineapple-weed
Rudbeckia hirta L. – Black-eyed Susan
Solidago canadensis L. – Canada Goldenrod
Euthamia graminifolia (L.) Nutt – Flat-topped, Bushy or Grass-leaved Goldenrod
Sonchus oleraceus L. – Common Sow-Thistle
Taraxacum officinale Wiggers – Common Dandelion
Tragopogon pratensis L. – Goats-Beard
Vernonia gigantea (Walter) – Ironweed
Xanthium strumarium – Cocklebur

Convolvulaceae: **Morning-glory Family**

Convolvulus arvensis L. – Field-Bindweed
Calystegia sepium L. – Hedge Bindweed

Cornaceae: **Dogwood Family**

Cornus alternifolia – Alternate-leaved Dogwood; Pagoda Dogwood
Cornus foemina ssp. racemosa Lam. – Gray Dogwood
Cornus stolonifera Michx. – Red-osier Dogwood

Corylaceae

Carpinus caroliniana Walt. – Ironwood

Cruciferae: **Mustard Family**

Alliaria petiolata (Bieb,)Cavara&Grande – Garlic Mustard
Barbarea vulgaris R.Br. – Common Wintercress; Yellow Rocket
Capsella bursa-pastoris L. – Shepherd's-purse
Cardamine bulbosa (Muhl.)BSP – Spring Cress
Cardamine douglassii Britton – Pink Spring Cress

Erucastrum gallicum Willd. – Dog Mustard
Erysimum cheiranthoides L. – Wormseed Mustard
Rorippa palustris L. – Mustard sp.; Yellow Cress

Cucurbitaceae: **Gourd Family**
Echinocystis lobata (Michx)T.&G. – Wild Cucumber

Cuscutaceae: **Dodder Family**
Cuscuta gronovii Schultes – Common or Swamp Dodder

Cyperaceae: **Sedge Family**
Carex annectens Bickn. – Sedge sp.
Carex brunnescens (Pers.)Poiret – Sedge sp.
Carex intumenscens Rudge – Sedge sp.
Carex granularis Willd. – Meadow Sedge
Carex muskingumensis Schw. – Sedge sp.
Carex lupulina Willd. – Hop Sedge
Carex tenera Dewey. – Sedge sp.
Cyperus diandrus Torrey – Low Flatsedge
Cyperous erythrorhizos Muhl. – Red-Rooted Flatsedge
Cyperus esculentus L. – Yellow Nutsedge
Cyperus strigosus L. – Straw-colored Nutsedge
Scirpus americanus Pers. – Threesquare
Scirpus atrovirens Willd. – Bulrush sp.
Scirpus fluviatilis Torr. – River Bulrush
Scirpus validus Vahl – Softstem Bulrush

Dioscoreaceae: **Yam Family**
Dioscorea villosa L. – Wild Yam

Dipsacaceae: **Teasel Family**
Dipsacus fullonum L. – Wild Teasel

Equisetaceae: **Horsetail Family**
Equisetum arvense L. – Field Horsetail
Equisetum hiemale L. – Common Scouring Rush

Euphorbiaceae: **Spurge Family**
Euphorbia nutans Lag. – Spurge Sp.

Fagaceae: **Beech Family**
Fagus grandifolia Ehrh. – Beech
Quercus alba L. – White Oak
Quercus macrocarpa Michx. – Bur Oak
Quercus rubra L. – Red Oak

Geraniaceae: **Geranium Family**
Geranium maculatum L. – Wild Geranium

Gentianaceae: **Gentian Family**
Gentiana andrewsii Griseb. – Closed or Bottle Gentian

Gramineae: **Grass Family**
Agrostis gigantea Roth. – Redtop
Bromus japonicus Murray – Japanese Brome
Echinochloa muricata (Beauv.)Fern. – Wild Millet
Elymus virginicus L. – Virginia Rye
Eragrostis hypnoides (Lam.)BSP. – Love Grass
Hordeum jubatum L. – Squirrel-tail Grass
Leersia Oryzoides (L.)Sw. – Rice Cutgrass
Leersia virginica Willd. – White Grass
Muhlenbergia frondosa f.*commutata* (Scribner)Fern. – Muhly Grass
Panicum clandestinum L. – Deer Tongue Grass or Corn Grass

Panicum dichotomiflorum Michaux – Spreading Witch-grass
Panicum virgatum L. – Switchgrass
Phalaris arundinacea L. – Reed Canary Grass
Phragmites australis (Cav.) Steudel – Common Reed
Setaria faberi Herrm. – Giant Foxtail
Setaria glauca (L.)Beauv. –Yellow Foxtail
Spartina pectinata Link – Freshwater (prairie) Cordgrass

***Hydrocharitaceae:* Frog's-bit Family**

Elodea nuttallii (Planchon) St.John – Waterweed; Elodea

***Iridaceae:* Iris Family**

Iris pseudacorus L. – Yellow Flag
Iris virginica L. – Southern Blue Flag

***Juncaceae:* Rush Family**

Juncus dudleyi Wieg – Dudley's Rush

***Juglandaceae:* Walnut Family**

Carya cordiformis (Wang) K.Koch – Bitternut Hickory
Carya laciniosa Michx. G. Don – Shellbark Hickory
Carya ovata (Miller) K.Koch – Shagbark Hickory
Juglans nigra L. – Black Walnut

***Labiatae:* Mint Family**

Glechoma hederacea – Ground Ivy; Gilt-over-the-ground; Creeping Charlie
Leonurus cardiaca L. – Motherwort
Lycopus americanus Muhl. – Water-Horehound
Lycopus virginicus L. – Bugleweed
Mentha arvensis L. –Wild Mint
Monarda fistulosa L. – Wild Bergamont
Nepeta cataria L. – Catnip; Catmint
Physostegia virginiana (L.)Benth. – False Dragonhead; Obedient Plant
Prunella vulgaris L. – Self-heal; Heal-all
Scutellaria galericulata – Marsh Skullcap
Scutellaria lateriflora L. – Mad-dog Skullcap
Stachys hispida Pursh. – Hedge Nettle sp.
Stachys tenuifolia Willd. – Hedge Nettle sp.
Teucrium canadense L. – Wood-Sage, Germander

***Lauraceae:* Laurel Family**

Lindera benzoin (L.)Blume – Spicebush

***Leguminosae:* Pea Family**

Apios americana Medicus – Groundnut: Wild-bean; Indian-potato
Coronilla varia L. – Crown Vetch
Lathyrus sylvestris L. – Perennial or Everlasting Pea
Lotus corniculata L. – Birdfoot Trefoil
Medicago lupulina L. – Black Medick
Melilotus alba Medicus – White Sweet-Clover
Melilotus officinalis L. – Yellow Sweet-Clover
Trifolium pratense L. – Red Clover

***Lemnaceae:* Duckweed Family**

Lemna minor L. – Lesser Duckweed
Lemna trisulca L. – Star Duckweed
Spirodela polyrhiza (L.) Schleiden – Greater Duckweed

Liliaceae: **Lily Family**

Asparagus officinalis L. – Garden Asparagus
Erythronium americana Ker – Trout-Lily, Adder's-Tongue; Dog tooth-violet
Lilium michiganense Farw. – Michigan Lily
Smilacina stellata (L.)Desf. – Starry False Solomon-Seal
Trillium grandiflorum (Michuax) Salisb – Common Trillium

Lythraceae: **Loosestrife Family**

Ammannia robusta Heer&Regel – Ammannia
Lythrum alatum Pursh – Winged Lythrum; Wing-angled Loosestrife
Lythrum salicaria L. – Purple Loosestrife

Malvaceae: **Mallow Family**

Abutilon theophrasti Medicus – Velvet Leaf
Hibiscus trionum L. – Flower-of-an-hour

Menispermaceae: **Moonseed Family**

Menispermum canadense L. – Moonseed

Moraceae: **Mulberry Family**

Morus alba L. – Russian Mulberry or White Mulberry
Morus rubra L. – Red Mulberry

Nymphaeaceae: **Water-lily Family**

Nuphar variegata Durand – Spatterdock; Yellow Pondlily
Nymphaea odorata Arlon – Sweet-scented White Water Lily; Water Nymph

Oleaceae: **Olive Family**

Fraxinus pennsylvanica var. *subintegerrima* (Vahl)Fern. – Green Ash or Red Ash
Fraxinus americana L. – White Ash

Onagraceae: **Evening Primrose Family**

Oenothera biennis L. – Common Evening Primrose

Osmundaceae: **Royal Fern Family**

Osmunda regalis L. – Royal Fern

Oxalidaceae: **Oxalis or Wood-sorrel Family**

Oxalis fontana Bunge – Wood-Sorrel

Penthoraceae: **Ditch Stonecrop Family**

Penthorum sedoides L. – Ditch Stonecrop

Plantaginaceae: **Plantain Family**

Plantago major L. – Common Plantain
Plantago rugelii Decne. – Broadleaf Plantain; Rugel's Plantain

Polemoniaceae: **Phlox Family**

Phlox divaricata L. – Wild Blue Phlox

Polygonaceae: **Smartweed Family**

Polygonum amphibuim L. var. *emersum* Michaux – Marsh or Water Smart weed
Polygonum hydropiperoides Michaux – Mild Water-Pepper
Polygonum lapathifolium L. – Nodding Smartweed; Willowweed
Polygonum pensylvanicum L. – Pinkweed; Bigseed Smartweed
Polygonum scandens L. – False Buck-wheat; Black-bindweed
Polygonum virginianum L. – Jumpseed
Rumex altissimus Wood – Dock sp.
Rumex crispus L. – Curly Dock or Sour Dock

Polypodiaceae: **Fern Family**

Dryopteris spinulosa (O.F.Mull.)Watt – Spinulose Woodfern, or Shield Fern
Matteuccia struthiopteris (L.) Todaro – Ostrich Fern
Onoclea sensibilis L. – Sensitive Fern
Thelypteris palustris Schott – Marsh Fern

Pontederiaceae: **Pickerel-weed Family**

Heteranthera dubia (Jacq.)MacM. f. *terrestris* (Farw.)Vict. – Water Star-Grass
Pontederia cordata L. – Pickerelweed

Portulacaceae: **Purslane Family**

Claytonia virginica L. – Spring Beauty
Portulaca oleracea L. – Common Purslane; Pusley

Potamogetonaceae: **Pondweed Family**

Potamogeton crispus L. – Curly Muck-weed; Pondweed
Potamogeton nodosus Poiret – Longleaf Pondweed
Potamogeton pectinatus L. – Sago Pondweed

Primulaceae: **Primrose Family**

Lysimachia ciliata L. – Fringed Loosestife
Lysimachia nummularia L. – Moneywort

Ranunculaceae: **Buttercup / Crowfoot Family**

Anemone canadensis L. – Canada Anemone
Ranunculus acris L. – Tall or Common Buttercup
Ranunculus flabellaris Raf. – Yellow Water Buttercup; Yellow Water Crowfoot
Ranunculus sceleratus L. – Cursed Crowfoot
Thalictrum dasycarpum Fisch. & Ave-Lall. – Purple Meadow-Rue
Thalictrum dioicum L. – Early Meadow-Rue

Rosaceae: **Rose Family**

Crataegus sp. – Hawthornes
Guem canadense Jacq. – Avens sp.
Guem laciniatum Murray – Avens
Prunus virginiana L. – Choke Cherry
Rosa blanda Aiton – Wild Rose
Rubus occidentalis L. – Black Raspberry
Spirea alba Duroi – Meadowsweet

Rubiaceae: **Madder Family**

Cephalanthus occidentalis L. – Buttonbush
Galium aparine L. – Cleavers ; Goosegrass
Galium obtusum Bigelow – Bluntleaf Bedstraw

Rutaceae: **Rue Family**

Zanthoxylum americanum Miller – Prickly-Ash

Salicaceae: **Willow Family**

Populus deltoides Marsh – Cottonwood
Populus tremuloides Michaux – Quaking Aspen
Salix discolor Muhl – Pussy Willow
Salix exigua Nutt. – Sandbar Willow
Salix nigra Marsh –Black Willow
Salix petiolaris J.E.Smith – Slender or Meadow Willow

Scrophulariaceae: **Snapdragon Family**

Lindernia dubia var. anagallidea (Michaux) Cooperr. – False Pimpernel

Mimulus ringens L. – Square-stemmed Monkey-flower
Penstemon digitalis Sims – Foxglove Beard-tongue
Verbascum blattaria L. – Moth Mullein
Vervascum thapsus L. – Common Mullein; Flannel Plant
Veronica anagallis-aquatica – Water Speedwell

Simaroubaceae: **Quassia Family**
Ailonthus altissima (Miller) Swingle – Tree-of-Heaven

Solanaceae: **Nightshade Family**
Solanum dulcamara L. – Bittersweet; Nightshade

Sparganiaceae: **Bur-reed Family**
Sparganium eurycarpum Engelm. – Giant Bur-reed

Staphyleaceae: **Bladdernut Family**
Staphylea trifolia L. – American Bladdernut

Tiliaceae: **Linden Family**
Tilia americana L. – Basswood, Linden

Typhaceae
Typha angustifolia L. – Narrow-leaved Cattail
Typha latifolia L. – Broad-leaved or Common Cattail

Ulmaceae: **Elm Family**
Celtis occidentalis L. – American Hackberry
Ulmus americana L. – American or White Elm

Umbelliferae: **Carrot or Parsley Family**
Daucus carota L. – Queen Anne's Lace; Wild Carrot
Pastinaca sativa L. – Wild Parsnip
Sanicula gregaria Bickn. – Black Snakeroot
Sium suave Walter – Water Parsnip
Torilis japonica (Houtt.)DC – Hedge Parsley

Urticaceae: **Nettle Family**
Boehmeria cylindrica L. – False Nettle
Laportea canadensis L. – Wood Nettle
Pilea pumila L., A. Gray – Clearweed; Richweed

Verbenaceae: **Vervain Family**
Phyla lanceolata Michaux – Frog-Fruit
Verbena hastata L. – Blue Vervain
Verbena urticifolia L. – White Vervain

Violaceae: **Violet Family**
Viola sororia Willd. – Common Blue Violet
Viola pubescens Aiton – Yellow Violet

Vitaceae: **Grape Family**
Parthenocissus quinquefolia (L.)Planchon – Virginia Creeper; Woodbine
Vitis riparia Michaux – Riverbank Grape

Fish Found or Expected to Occur in the Rivers that Flow into the Shiawassee National Wildlife Refuge

Species	Species
Alewife	Perch, pirate
Bass, largemouth	Perch, trout
Bass, rock	Perch, yellow
Bass, smallmouth	Pike, northern
Bass, white	Quillback
Bluegill	Redhorse, golden
Bowfin	Redhorse, shorthead
Buffalo, bigmouth	Redhorse, silver
Bullhead, black	Salmon, chinook
Bullhead, yellow	Salmon, coho
Carp, common	Shad, gizzard
Catfish, channel	Shiner, blacknose
Chub, creek	Shiner, common, plus hybrids
Chub, hornyhead	Shiner, emerald
Chub, river	Shiner, golden
Crappie, black	Shiner, mimic
Crappie, white	Shiner, sand
Dace, finescale	Shiner, spotfin
Dace, northern redbellied	Shiner, spottail
Darter, blackside	Shiner, striped
Darter, channel (MIT)	Silversides, brook
Darter, Iowa	Smelt, rainbow
Darter, Johnny	Stickleback, brook
Darter, river (MIT)	Stonecat
Drum, freshwater	Stoneroller
Gar, longnose	Sturgeon, lake (MIT)
Goldfish	Sucker, white
Hogsucker, northern	Sunfish, green
Lamprey, sea	Sunfish, longear
Lamprey, silver	Sunfish, pumpkinseed
Lapomis sp. (Hybrids)	Trout, brown
Minnow, bluntnose	Trout, lake
Minnow, brassy	Trout, rainbow
Minnow, fathead	Walleye
Mudminnow, central	
Perch, log	

Species (**Bold** indicates species that are abundant or common on the refuge for at least part of the year)	Nested on refuge recently Y=Yes	Status On Refuge				Potential Benefit by Habitat Objectives (Habitat used regularly for **f**ood, **n**esting, or **c**over) * indicates the species is found in habitat as result of best management practices where buffer strips and ditches develop a beneficial plant structure										Status In Region and State
		a - abundant: a common species that is very numerous c - common: certain to be seen or heard in suitable habitat, not in large numbers u - uncommon: present, but not always seen o - occasional: seen only a few times during the season r - rare: seen every two to five years				1	2	3	4	5	6	7	8	9	10	R3 - Region 3 Conservation Priority SMC - Species of Mgt. Concern SSC- State Special Concern ST - State Threatened SE - State Endangered T - Federal Threatened E - Federal Endangered
		Spring	Summer	Fall	Winter	Unfragmented Forest	Multi-story Forest	Green Tree Reservoir	Deep Water Pools	Moist Soil Units 200 acres	Emergent Marsh	Grasslands 400 acres	Croplands 980 acres	Cropland converted to moist soil,	Riverine, includes habitat up to normal high water	
Birds With Special Regional Status and Present in Numbers That Make a Significant Contribution to the Local Population																
Rare/Declining Concerns																
Least bittern	Y	r	o	r				f,c		f,c	f,n,c			f,n,c	f,n,c	R3,SMC,ST
Canada goose (SJBP)	Y	a	c	a	a			f,c	f,c	f,n,c	f,n,c	n,c	f,c	f,n,c	f,n,c	R3
Northern pintail		u		u						f,c	f,c	f,c	f,c	f,c	c	SMC
Lesser scaup		u		u					f,c		f,c			f,c	f,c	SMC
Bald eagle	Y	u	u	u	u	n,c	n,c	f,c	f		f			f,c	f,n,c	R3,T,ST
Northern harrier		u	o	u	u					f,c		f,n,c	f,c	f,c		SMC,SSC
Common tern		u		u					f	f,c	f,c			f,c	f,c	R3,SMC,ST
Black tern		r	o	r					f,c		f,n,c					R3,SMC,SSC

Species (**Bold** indicates species that are abundant or common on the refuge for at least part of the year)	**Nesting ?**	**Status on Refuge** (See top of table for codes)				**Potential Benefit** f=food, n=nesting, c=cover; *see top of table for explanation										**Status In Region and State** (See top for codes)
	Y=Yes	Sp	S	Fall	W	Unfragmented	Multi-story Forest	Green Tree Reservoir	Deep Water Pools	Moist Soil Units	Emergent Marsh	Grasslands	Croplands	Converted Croplands	Riverine	
Red-headed woodpecker	Y	u	u	u		f	f					*f,c	*f,c		f,n,c	SMC
Northern flicker	Y	c	c	c	r	f,n,c	f,n,c					*f,n,c	*f,c		f,n,c	SMC
Wood thrush	Y	u	u	u		f,n,c	f,n,c	f							f,n,c	R3,SMC
Bobolink	Y	o	o	u								f,n,c		f,n,c		R3,SMC
Eastern meadowlark		o	r	r								f,n,c		f,c		R3,SMC
Chestnut-sided warbler		u		u			f,n,c									SMC
Recreational/Economic Value Concerns																
Wood duck	Y	c	c	c		n	n	f,c		f,c	f,n,c		f,c	f,c	f,n,c	R3
American black duck		c	u	c	c			f,c	c	f,c	f,c	f,c	f,c	f,c	f,c	R3
Mallard	Y	a	c	a	c			f,c	c	f,n,c	f,n,c	f,n,c	f,n,c	f,n,c	f,n,c	R3
Blue-winged teal	Y	c	u	c				f,c		f,n,c	f,n,c	f,n,c	f,c	f,n,c	c	R3
Canvasback		o		o					f,c		f,c			f,c	f,c	R3
Nuisance Concerns																
Double-crested cormorant		c		c					f,c		f,c			f,c	f,c	R3
Canada goose (Urban giants)	Y	a	c	a	a			f,c	f,c	f,n,c	f,n,c	n,c	f,c	f,n,c	f,n,c	R3
State Concerns																
Caspian tern		u		u					f		f,c				f,c	ST
Black-crowned night heron		u	u	u				f,c			f,c				f,c	SSC
Cooper's hawk		o	r	o	r	n	n			f		f,c	f,c	f,c	f,c	SSC
Common moorhen	Y	u	u	u					f,n,c	f,c	f,n,c			f,c	f,c	SSC

Prothonotary warbler	Y	u	u	r		f,n,c	f,n,c								f,n,c	SSC
Wilson's phalarope		r		o						f,c	f,c			f,c	f	SSC
Birds with Special Regional Status, But Rare on the Refuge																
American bittern		r	r					f,c		f,c	f,n,c	n,c		f,n,c	f,n,c	R3,SMC,SSC
Northern goshawk				r	r	f,c	f,c	f,c		f		*f,c	*f,c	f,c	c	R3,SMC,SSC
Red-shouldered hawk		r	r	r	r	f,n,c	f,n,c			f	f	*f	*f,c	f,c	f,n,c	R3,SMC,ST
Peregrine falcon										f,c	f,c	f,c	f,c	f,c	c	R3,E,SE
Upland sandpiper		r		r						f,c	f,c	f,c	f,c	f,c	f	R3,SMC
American woodcock		r	r	r		f,c	f,c						f,c		f,c	R3
Short-eared owl					r					f,c		f,c	f,c	f,c		R3,SMC,SE
Olive-sided flycatcher		r		r												R3,SMC
Sedge wren	Y	r	r	r						f,n,c	f,n,c	f,n,c		f,n,c		R3,SMC
Veery		r		r		f,n,c	f,n,c								f,n,c	R3,SMC
Blue-winged warbler		r		r			f,n,c			f,n,c					f,n,c	R3,SMC
Golden-winged warbler		r		r			f,n,c			f,n,c					f,n,c	R3,SMC
Cerulean warbler		r	r	r		f,n,c	f,n,c								f,n,c	R3,SMC,SSC
Kirtland's warbler		r		r						f,c		f,c	f,c		f,c	R3,E,SE
Field sparrow	Y	r	r	r								f,n,c	f,n,c			R3,SMC
Osprey		r	r	r				f,c	f		f			f	f,c	ST
Merlin				r						f,c	f,c	f,c	f,c	f,c	f,c	ST
Forster's tern			r						f		f,c				f,c	SSC
Yellow-headed blackbird	Y	r	r								f,n,c			f,n,c		SSC
Birds Currently Not on Regional Lists																
Pied-billed grebe	Y	u	u	u					f,c		f,n,c			f,n,c	f,n,c	

Species (**Bold** indicates species that are abundant or common on the refuge for at least part of the year)	**Nesting ?**	**Status on Refuge** (See top of table for codes)				**Potential Benefit** f=food, n=nesting, c=cover; *see top of table for explanation										**Status In Region and State** (See top for codes)
	Y=Yes	Sp	S	Fall	W	Unfragmented	Multi-story Forest	Green Tree Reservoir	Deep Water Pools	Moist Soil Units	Emergent Marsh	Grasslands	Croplands	Converted Croplands	Riverine	
Great blue heron		a	a	a	u	n	n	f,c		f,c	f,n,c		*f,c	f,n,c	f,n,c	
Great egret		u	c	c				f,c		f,c	f,c		*f,c	f,c	f,c	
Green heron	Y	u	u	u		n	n	f,c		f,c	f,n,c		*f	f,c	f,n,c	
Tundra swan		u		u					f,c	f,c	f,c		f,c	f,c	f,c	
Snow goose		u	u	o					c	f,c	f,c		f,c	f,c	f,c	
Green-winged teal		c	o	c				f,c		f,c	f,c	f,c	f,c	f,c	f,c	
Northern shoveler		u		u						f,c	f,n,c	f,n,c	f,c	f,n,c	c	
Gadwall		o		o						f,c	f,c	f,c	f,c	f,c	c	
American wigeon		u		u				f,c		f,c	f,c	f,c	f,c	f,c	c	
Redhead	Y	o	r	o					f,c		f,n,c			f,c	f,n,c	
Ring-necked duck		u		u				f,c	f,c		f,c			f,c	f,c	
Common goldeneye		o		o	o				f,c		f,c			f,c	f,c	
Bufflehead		u		u				f,c	f,c	f,c	f,c			f,c	f,c	
Hooded merganser	Y	u	o	u		n	n	f,c	f		f,c			f,c	f,n,c	
Common merganser		c	r	a	c			f	f,c		f,c			f,c	f,c	
Ruddy duck		u		u					f,c		f,c			f,c	f,c	
Turkey vulture		u	u	u		f,n,c	f,n,c			f		f	f			
Sharp-shinned hawk		o	r	o	r					f		*f,c	*f,c	f,c	f,c	
Red-tailed hawk	Y	c	c	c	c	f,n,c	f,n,c			f	f,c	f	f,c	f,c	f,n,c	
Rough-legged hawk		r		r	u					f		f,c	f,c	f,c		

American kestrel		o	r	o	o					f		f,c	f,c	f		
Ring-necked pheasant	Y	u	u	u	u					f,c	c	f,c	f,c	f,c		
Virginia rail	Y	u	u	u							f,n,c			f,n,c	f,n,c	
Sora	Y	u	u	u							f,n,c			f,n,c	f,n,c	
American coot	Y	u	u	u					f,n,c	f,c	f,n,c			f,c	f,n,c	
Black-bellied plover		o		o						f,c	f,c		f,c	f,c	f	
Semipalmated plover		u		u						f,c	f,c		f,c	f,c	f	
Killdeer	Y	c	c	c						f,c	f,c		f,c	f,c	f	
Greater yellowlegs		c		c						f,c	f,c		f,c	f,c	f	
Lesser yellowlegs		c		c						f,c	f,c		f,c	f,c	f	
Solitary sandpiper		u		u						f,c	f,c		f,c	f,c	f	
Spotted sandpiper	Y	c	c	c						f,n,c	f,c		f,c	f,n,c	f	
Semipalmated sandpiper		u		u						f,c	f,c		f,c	f,c	f	
Least sandpiper		u		u						f,c	f,c		f,c	f,c	f	
White-rumped sandpiper		o		o						f,c	f,c		f,c	f,c	f	
Baird's sandpiper		o		o						f,c	f,c		f,c	f,c	f	
Pectoral sandpiper		u		u						f,c	f,c		f,c	f,c	f	
Stilt sandpiper		o		u						f,c	f,c		f,c	f,c	f	
Dunlin		c		u						f,c	f,c		f,c	f,c	f	
Short-billed dowitcher		u		u						f,c	f,c		f,c	f,c	f	
Long-billed dowitcher		r		o						f,c	f,c		f,c	f,c	f	
Common snipe		u		u						f,c	f,c	f,c	f,c	f,c	f	
Bonaparte's gull		u		u		f,c	f,c		f,c	f,c	f,c		f,c	f,c	f,c	
Ring-billed gull		c	c	a	o	f,c	f,c		f,c	f,c	f,c		f,c	f,c	f,c	
Herring gull		u	u	c	u				f,c	f,c	f,c		f,c	f,c	f,c	
Mourning dove	Y	c	c	c	c	f,n,c	f,n,c,						f,c		f,n,c	

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Black-billed cuckoo	Y	o	o	o								f,c	f,c		f,n,c	
Yellow-billed cuckoo	Y	o	o	o								f,c	f,c		f,n,c	
Eastern screech-owl	Y	u	u	u	u					f	f,c	f,c	*f,c	f	f,n,c	
Great horned owl	Y	u	u	u	u	f,n,c	f,n,c			f		f	*f		f,n,c	
Barred owl	Y	u	u	u	u	f,n,c	f,n,c			f		f	*f	f	f,n,c	
Common nighthawk		o		o						f	f	f,c	f,c	f	f	
Chimney swift		o	o	o						f	f	f	f	f	f,n,c	
Ruby-throated hummingbird		u	o	o						f	f	f		f	f,n,c	
Belted kingfisher	Y	u	u	u				f	f		f				f,n,c	
Red-bellied woodpecker	Y	c	c	c	c	f,n,c	f,n,c								f,n,c	
Downy woodpecker	Y	c	c	c	c	f,n,c	f,n,c					*f			f,n,c	
Hairy woodpecker	Y	u	u	u	u	f,n,c	f,n,c								f,n,c	
Eastern wood pewee	Y	c	c	u		f,n,c	f,n,c			f	f	*f			f,n,c	
Alder flycatcher						f,n,c	f,n,c			f,n,c	f,n,c	*f			f,n,c	
Willow flycatcher	Y	u	u	o		f,n,c	f,n,c			f,n,c	f,n,c	*f,n,c			f,n,c	
Least flycatcher	Y	u	u	o						f,n,c	f,n,c	*f,n,c			f,n,c	
Eastern phoebe	Y	u	u	u						f,n,c	f,n,c	*f,n,c			f,n,c	
Great crested flycatcher	Y	c	c	u		f,n,c	f,n,c			f	f	f			f,n,c	
Eastern kingbird	Y	u	u	u						f,n,c		f,n,c	*f,n,c			
Horned lark	Y	c	c	c	c					f,n,c		f,n,c	*f,n,c	f,n,c		

Tree swallow	Y	a	c	a						f,n,c	f,n,c	f,n,c	*f	f	f,n,c	
Northern rough-winged swallow	Y	c	u	c						f,c	f,c	f,c	*f,n	f,c	f,n,c	
Bank swallow		c	u	c						f,c	f,c	f,c	*f,c	f,c	f,n,c	
Cliff swallow										f,c	f,c	f,c	*f,n,c	f,c	f,n,c	
Barn swallow	Y	c	c	c						f,c	f,c	f,c	*f,n,c	f,c	f,n,c	
Blue jay	Y	c	c	c	c		f,n,c					f	f		f,,n,c	
American crow	Y	c	c	c	c	f,n,c	f,n,c			f,c		f	f,c		f,n,c	
Black-capped chickadee	Y	a	a	a	a	f,n,c	f,n,c					f	f		f,n,c	
Tufted titmouse	Y	c	c	c	c	f,n,c	f,n,c								f,n,c	
White-breasted nuthatch	Y	c	c	c	c	f,n,c	f,n,c								f,n,c	
Brown creeper	Y	c	u	u	u	f,n,c	f,n,c								f,n,c	
House wren	Y	c	c	c		f,n,c	f,n,c					f,c	*f,n,c		f,n,c	
Marsh wren	Y	c	c	c							f,n,c			f,n,c		
Golden-crowned kinglet		u		u		f,c	f,c								f,c	
Ruby-crowned kinglet		u		u		f,c	f,c					f,c			f,c	
Blue-gray gnatcatcher	Y	u	u	o		f,n,c	f,n,c								f,n,c	
Eastern bluebird	Y	u	o	u			f,n,c					f,n,c	*f,n,c			
Gray-cheeked thrush		o		o												
Swainson's thrush		u		u		f,c	f,c								f,c	
Hermit thrush		u		u		f,c	f,c								f,c	
American robin	Y	a	a	a	r	f,n,c	f,n,c				f	f,c	*f,n,c		f,n,c	
Gray catbird	Y	c	c	c			f,n,c			f,c		f,c	*f,n,c		f,n,c	
Brown thrasher	Y	o	o	o			f,n,c			f,c		f,c	*f,n,c		f,n,c	
Cedar waxwing	Y	u	u	u	u							f,c	*f,n,c		f,n,c	
Northern shrike					o											
European starling	Y	c	c	c	c					f,c		f,c	*n,c	f,c	n,c	

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Yellow-throated vireo	Y	o	o	r			f,n,c								f,n,c	
Warbling vireo	Y	u	u	u			f,n,c			f,c		f,n,c	f,c		f,n,c	
Red-eyed vireo	Y	u	u	u		f,n,c	f,n,c								f,n,c	
Tennessee warbler		u		u		f,c	f,c								f,c	
Nashville warbler		u		u			f,n,c			f,c	f,c	f,c			f,c	
Yellow warbler	Y	c	c	c			f,n,c			f,n,c		f,n,c			f,n,c	
Magnolia warbler		u		u			f,c			f,c		f,c			f,c	
Cape May warbler		u		u			f,c			f,c		f,c			f,c	
Black-throated blue warbler		u		u		f,c	f,c								f,c	
Blackburnian warbler		u		u			f,c			f,c		f,c			f,c	
Palm warbler		u		u			f,c			f,c		f,c			f,c	
Bay-breasted warbler		u		u		f,c	f,c			f,c		f,c			f,c	
Blackpoll warbler		o		o												
Black-and-white warbler		u		u		f,n,c	f,n,c								f,n,c	
American redstart	Y	u	u	u		f,n,c	f,n,c			f,c		f,c			f,n,c	
Ovenbird	Y	u	u	u		f,n,c	f,n,c									
Northern waterthrush		u		u		f,n,c	f,n,c								f,n,c	
Mourning warbler		o		o			f,c			f,n,c		f,n,c			f,n,c	
Common yellowthroat	Y	c	c	c						f,n,c	f,nc	f,n,c			f,n,c	
Hooded warbler						f,n,c	f,n,c								f,n,c	

Wilson's warbler		u		u		f,c	f,c			f,c		f,c			f,c	
Canada warbler		u		u			f,c			f,c		f,c			f,n,c	
Scarlet tanager	Y	u	u	o		f,n,c	f,n,c								f,c	
Northern cardinal	Y	c	c	c	c					f,n,c	f,n,c	f,n,c			f,n,c	
Rose-breasted grosbeak	Y	c	u	u			f,n,c				f,n,c	f,n,c			f,n,c	
Indigo bunting	Y	u	u	u			f,n,c			f,n,c	f,n,c	f,n,c	f,n,c	f,n,c	f,n,c	
Rufus-sided towhee		o	r	o			f,n,c			f,n,c		f,n,c				
American tree sparrow		o			c		f,c			f,c	f,c	f,c			f,c	
Chipping sparrow	Y	u	u	u								f,n,c				
Vesper sparrow	Y	u	u	u								f,n,c	f,n,c			
Savannah sparrow	Y	c	c	c						f,n,c	f,n,c	f,n,c	f,n,c	f,n,c		
Fox sparrow		o		o												
Song sparrow	Y	a	a	a	o		f,n,c			f,n,c	f,n,c	f,n,c	f,n,c	f,n,c	f,n,c	
Lincoln's sparrow		o		o			f,c			f,c	f,c	f,c	f,c	f,c	f,c	
Swamp sparrow	Y	o	o	o						f,n,c	f,n,c	f,n,c		f,n,c		
White-crowned sparrow		u		u			f,c			f,c	f,c	f,c	f,c	f,c	f,c	
White-throated sparrow		c		c			f,c			f,c	f,c	f,c		f,c		
Dark-eyed junco		c		c	u		f,c			f,c	f,c	f,c	f,c	f,c	f,c	
Lapland longspur		o			r					f,c		f,c	f,c			
Snow bunting		o			u					f,c		f,c	f,c			
Red-winged blackbird	Y	a	a	a	r					f,n,c	f,n,c	f,n,c	f,c	f,n,c		
Rusty blackbird		u		u			f,c			f	f,c	f	f	f,c	f,c	
Common grackle	Y	c	c	c			f,n,c			f,c	f,n,c	f,c	f	f,n,c	f,n,c	
Brown-headed cowbird	Y	c	c	c	r		f,n,c			f,n,c	f,c	f,n,c	f,c	f,n,c	f,n,c	
Northern oriole	Y	u	u	o			f,n,c								f,n,c	
American goldfinch	Y	a	a	a	a					f,n,c	f,n,c	f,,n,c	f,c		f,n,c	

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House sparrow		u	u	u	u		f,n,c			f,c		f,c	f,n,c		f,n,c	
Birds Currently Not on Regional Lists And Rare on the Refuge																
Horned grebe		r		r					f,c		f,c			f,c	f,c	
American white pelican		r	r						f,c		f,c			f,c	f,c	
Cattle egret		r	r							f,c	f,c	f,c	f,c	f,c	f,c	
Greater white-fronted goose				r					c	f,c	f,c		f,c	f,c	f,c	
Greater scaup		r		r					f,c		f,c			f,c	f,c	
Red-breasted merganser		r		r					f,c		f,c				f,c	
Broad-winged hawk		r	r	r		f,n,c	f,n,c			f		f	f,c	f,c	f,n,c	
Golden eagle		r		r	r							I	I	I		
Ruffed grouse		r	r	r	r	f,n,c	f,n,c									
Wild turkey						f,n,c	f,n,c					f,n,c	f,c			
Sandhill crane		r		r						f,c		f,c	f,c			
Amercian golden plover										f,c	f,c		f,c	f,c	f	
American avocet		r		r						f,c	f,c		f,c	f,c	f	
Hudsonian godwit		r		r						f,c	f,c		f,c	f,c	f	
Marbled godwit		r								f,c	f,c		f,c	f,c	f	
Red knot				r						f,c	f,c		f,c	f,c	f	
Sanderling				r						f,c	f,c		f,c	f,c	f	
Red-necked phalarope		r		r						f,c	f,c		f,c	f,c	f	

Whimbrel											f,c	f,c		f,c	f,c	f	
Ruff											f,c	f,c		f,c	f,c	f	
Snowy owl						r					f,c		f,c	f,c			
Pileated woodpecker	Y	r	r	r	r	f,n,c	f,n,c									f,n,c	
Red-breasted nuthatch					r	f,,c	f,c									f,c	
Winter wren		r		r		f,c	f,c									f,c	
Water pipet		r		r													
Solitary vireo		r		r													
Philadelphia vireo		r		r			f,c									f,c	
Orange-crowned warbler		r		r												f,c	
Northern parula		r		r			f,n,c									f,c	
Connecticut warbler		r		r		f,c	f,c				f,c		f,c			f,c	
Eastern towhee							f,n,c				f,n,c		f,n,c				
Brewer's blackbird		r		r							f,c	f,c	f,c	f	f,c	f,c	
Purple finch					r		f,c									f,c	
House finch														f,n,c			
Common redpoll					r												
Hoary redpoll																	
Pine siskin					r		f,c				f,c		f,c	f,c	f,c	f,c	
Evening grosbeak					r		f,c				f,c	f,c	f,c	f,c	f,c	f,c	
Birds Incidental on the Refuge																	
Common loon																	R3,SMC
Trumpeter swan																	R3,SMC,SE
Prairie warbler											f,c		f,c				R3,SMC,SE
King rail																	SE
Snowy egret																	

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Ross' goose										f,c	f,c		f,c	f,c		
Black-necked stilt										f,c	f,c		f,c	f,c	f	
Willet										f,c	f,c		f,c	f,c	f	
Glaucous gull									f,c		f,c		f,c		f,c	
Great black-backed gull									f,c		f,c		f,c		f,c	
Acadian flycatcher						f,n,c	f,n,c									
Carolina wren						f,n,c	f,n,c								f,n,c	
Yellow-breasted chat										f,c		f,c			f,n,c	
Dickcissel	Y											f,n,c		f,n,c		

Shiawassee National Wildlife Refuge
Wildlife Species

Mammals

Virginia Opossum – *Didelphis virginiana*
Northern Short-tailed Shrew – *Blarina brevicauda*
Star-nosed Mole – *Condylura cristata*
Big Brown Bat – *Eptesicus fuscus*
Little Brown Bat – *Myotis lucifugus*
Coyote – *Canis latrans*
Red Fox – *Vulpes vulpes*
Raccoon – *Procyon lotor*
Long-tailed Weasel – *Mustela frenata*
Least Weasel – *Mustela nivalis*
Mink – *Mustela vision*
Striped Skunk – *Mephitis mephitis*
River Otter – *Lutra canadensis*
White-tailed Deer – *Odocoileus virginianus*
Southern Flying Squirrel – *Glaucomys volans*
Woodchuck – *Marmota monax*
Gray Squirrel (Black Morph) – *Sciurus carolinensis*
Fox Squirrel – *Sciurus niger*
Eastern Chipmunk – *Tamias striatus*
Red Squirrel – *Tamiasciurus hudsonicus*
Beaver – *Castor canadensis*
White-footed Mouse – *Peromyscus leucopus*
Deer Mouse – *Peromyscus maniculatus*
Meadow Vole – *Microtus pennsylvanicus*
Muskrat – *Ondatra zibethicus*
Meadow Jumping Mouse – *Zapus hudsonius*
Eastern Cottontail – *Sylvialagus floridanus*

Reptiles

Blanding's Turtle – *Empydoidea blandingii*
Common Map Turtle – *Graptemys geographica*
Midland Painted Turtle – *Chrysemys picta margnata*
Snapping Turtle – *Chelydra serpentina serpentina*
Eastern Spiny Softshell Turtle – *Trionyx spiniferus spiniferus*
Eastern Garter Snake – *Thamnophis sirtalis sirtalis*
Butler's Garter Snake – *Thamnophis butleri*
Eastern Fox Snake – *Elaphe vulpina glovdi*
Eastern Milk Snake – *Lampropeltis triangulumn triangulum*

Amphibians

Red-backed Salamander – *Plethodon cinereus*
Blue-spotted Salamander – *Ambystoma laterale Hallowell*
American Toad – *Bufo americanus Holbrook*
Northern Spring Peeper – *Hyla crucifer crucifer*

Gray Treefrog – *Hyla versicolor/chrysoscelis*
Western Chorus Frog – *Pseudacris triseriata triseriata*
Green Frog – *Rana clamitans melanota*
Wood Frog – *Rana sylvatica*
Northern Leopard Frog – *Rana pipiens*

Invertebrates

No formal, complete survey of Refuge invertebrates exists, so the following is an incomplete listing representing only those species documented.

Damselflies
(*Calopterygidae*):
American Rubyspot – *Hetaerina americana*

Dragonflies
Darners (*Aeshnidae*):
Lance-tailed Darner – *Aeshna constricta*
Common Green Darner – *Anax junius*
Clubtails (*Compidae*):
Midland Clubtail – *Gomphus fraternus*
Emeralds (*Corduliidae*):
Common Baskettail – *Epitheca cynosura*
Skimmers (*Libellulidae*)
Calico Pendant – *Celithemis elisa*
Halloween Pendant – *Celithemis eponina*
Eastern Pondhawk – *Erythemis simplicicollis*
Dot-tailed Whiteface – *Luecorrhinia intacta*
Widow Skimmer – *Libellula luctuosa*
Common Whitetail – *Libellula /Plathemis lydia*
Twelve-spotted Skimmer – *Libellula pulchella*
Blue Dasher – *Pachydiplax longipennis*
Wandering Glider – *Pantala flavesens*
Eastern Amberwing – *Perithemis tenera*
Ruby Meadowfly – *Sympetrum rubicundulum*
Yellow-legged Meadowfly – *Sympetrum vicinum*
Carolina Saddlebags – *Tramea carolina**
Black Saddlebags – *Tramea lacerata*

Butterflies

Papilionidae:
Black Swallotail – *Papilio polyxenes asterious*
Tiger Swallowtail – *Papilio glaucus*
Giant Swallowtail – *Papilio cresphontes*
Pieridae:
Cabbage White – *Pieris rapae*
Clouded Sulfur – *Colias philodice eriphyle*
Lycaenidae:
Bronze Copper – *Lycaena hyllus*
Acadian Hairstreak – *Satyrium acadia*

* Identification tentative, based on current state odonata list.

Banded Hairstreak – *Saytyrium calanus*
Eastern Tailed Blue – *Everes comyntas*
Spring Azure – *Celastrina ladon*

Nymphalidae:

American Snout – *Libytheana carinenta*
Great Spangled Fritillary – *Speyeria cybele*
Pearl Crescent – *Phyciodes tharos*
Question Mark – *Polygonia interrogationis*
Eastern Comma – *Polygonia comma*
Gray Comma – *Polygonia progne*
Milbert's Tortoise Shell – *Nymphalis milberti*
Mourning Cloak – *Nymphalis antiopa*
Baltimore – *Euphydryas phaeton*
American Painted Lady – *Vanessa virginiensis*
Painted Lady – *Vanessa cardui*
Red Admiral – *Vanessa atalanta rubria*
Buckeye – *Junonia coenia*
Red-spotted Purple – *Limenitis arthemis astyanax*
Viceroy – *Limenitis archippus*
Hackberry Emperor – *Asterocampa celtis*
Northern Pearly Eye – *Enodia anthedon*
Little Wood Satyr – *Megisto cymela*
Common Wood Nymph – *Cerlyonis pegala*
Monarch – *Danaus plexippus*

Hesperiidae:

Juvenal's Duskywing – *Erynnis juvenalis*
Silver-spotted Skipper – *Epargyreus clarus*
Common Sooty Wing – *Pholisora cattullus*
Least Skipper – *Ancyloxypha numitor*
European Skipper – *Thymelicus lineola*
Yellow-patched Skipper – *Polites peckius*
Little Glassy Wing – *Pompeius verna*

Moths

Sphingidae:

Modest Sphinx – *Pachysphinx modesta*
Pandorus Sphinx – *Eumorpha pandorus*
White-lined Sphinx – *Hyles lineata*
Lettered Sphinx – *Deidamia inscripta*

Saturniidae:

Polyphemus Moth – *Antheraea polyphemus*
Cercropia Moth – *Hyalophora cecropia*

Arctiidae:

LeConte's Haploa – Haploa lecontei
Isbella tiger Moth – Pyrrharctia isabella
Salt Marsh Moth – Estigmene acrea
Fall Webworm Moth – Hyphantria cunea
Yellow Bear Moth – Spilosoma dubia

Virgin Tiger Moth – *Grammia virgo*
Delicate Cycnia – *Cycnia tenera*
Oregon Cycnia – *Cycnia oregonensis*
Milkweed Tussock Moth – *Euchaetes egle*
Virginia Ctenucha – *Ctenucha virginica*
Yellow-collared Scape Moth – *Cisseps fulvicollis*

Noctuidae:

Old Man Dart – *Agrotis vetusta*
Ipsilon Dart – *Agrostis ipsilon*
Dingy Cutworm Moth – *Feltia jaculifera*
Master's Dart – *Feltia herilis*
Rubbed Dart – *Euxoa detersa*
Clandestine Dart – *Spaelotis clandestina*
Catocaline Dart – *Cryptocala acadiensis*
Armyworm Moth – *Pseudaletia unipuncta*
Northern Burdock Borer – *Papaipema arctivorens*
Copper Underwing – *Amphipyra pyramidoides*
Pearly Wood-nymph – *Eudryas unio*
Eight-spotted Forester – *Alypia octomaculata*
Common Looper Moth – *Autographa precationis*
Celery Looper Moth – *Anagrapha falcifera*
Forage Looper Moth – *Caenurgina erechtea*
The Herald – *Scoliopteryx libatrix*
Maple Zale – *Zale galbanata*
Maple Looper Moth – *Parallelia bistriaris*
Darling Underwing – *Calocala cara*
Green Cloverworm Moth – *Plathypena scabra*
Spotted Grass Moth – *Rivula propinqualis*
Yellowish Zanclognatha – *Zanclognatha ochreipennis*
Wavy-lined Zanclognatha – *Zanclognatha ochreipennis*

Geometridae:

Lesser Maple Spanworm Moth – *Itame pustularia*
Porcelain Gray – *Protoboarmia porcelaria*
Linden Looper Moth – *Erannis tiliaria*
False Crocus Geometer – *Xanthotype urticaria*
Crocus Geometer – *Xanthotype sospeta*
Pale Beauty – *Campaea perlata*
Elm Spanworm Moth – *Ennomos magnaria*
Common Metarranthis – *Metarranthis angularia*
White Slant Line – *Tetracis cachexiata*
Large Maple Spanworm Moth – *Prochoerodes transversata*
Horned Spanworm Moth – *Nematocampa limbata*
Wavy-lined Emerald – *Synchlora aerata albolineata*
Chickweed Geometer – *Haematopis grataria*
Large Lace-border – *Scopula limboundata f. relevata*
Soft-lined Wave – *Scopula inductata*
Lesser Grapevine Looper Moth – *Eulithis diversilineata*
Barberry Geometer – *Coryphista meadii*
White-banded Toothed Carpet – *Epirrhoe alternata*
The Beggar – *Eubaphe mendica*

Three-patched Bigwing – *Heterophelps refusaria*
Three-spotted Fillip – *Heterophelps triguttaria*

Pterophoriadae:

Plume Moth – *Platyptillia carduidactyla*
Plume Moth – *Emmelina monodactyla*

Pyraliadae:

European Corn Borer Moth – *Ostrinia nubilalis*

Tortricidae:

Oblique-banded Leafroller Moth – *Choristoneura rosaceana*
Sparganothis Fruitworm Moth – *Sparganothis sulfureana*

Appendix F: Compliance Requirements

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Rivers and Harbor Act (1899) (33 U.S.C. 403): Section 10 of this Act requires the authorization by the U.S. Army Corps of Engineers prior to any work in, on, over, or under a navigable water of the United States.

Antiquities Act (1906): Authorizes the scientific investigation of antiquities on Federal land and provides penalties for unauthorized removal of objects taken or collected without a permit.

Migratory Bird Treaty Act (1918): Designates the protection of migratory birds as a Federal responsibility. This Act enables the setting of seasons, and other regulations including the closing of areas, Federal or non-Federal, to the hunting of migratory birds.

Migratory Bird Conservation Act (1929): Establishes procedures for acquisition by purchase, rental, or gift of areas approved by the Migratory Bird Conservation Commission.

Fish and Wildlife Coordination Act (1934), as amended: Requires that the Fish and Wildlife Service and State fish and wildlife agencies be consulted whenever water is to be impounded, diverted or modified under a Federal permit or license. The Service and State agency recommend measures to prevent the loss of biological resources, or to mitigate or compensate for the damage. The project proponent must take biological resource values into account and adopt justifiable protection measures to obtain maximum overall project benefits. A 1958 amendment added provisions to recognize the vital contribution of wildlife resources to the Nation and to require equal consideration and coordination of wildlife conservation with other water resources development programs. It also authorized the Secretary of Interior to provide public fishing areas and accept donations of lands and funds.

Migratory Bird Hunting and Conservation Stamp Act (1934): Authorized the opening of part of a refuge to waterfowl hunting.

Historic Sites, Buildings and Antiquities Act (1935), as amended: Declares it a national policy to preserve historic sites and objects of national significance, including those located on refuges. Provides procedures for designation, acquisition, administration, and protection of such sites.

Refuge Revenue Sharing Act (1935), as amended: Requires revenue sharing provisions to all fee-title ownerships that are administered solely or primarily by the Secretary through the Service.

Transfer of Certain Real Property for Wildlife Conservation Purposes Act (1948): Provides that upon a determination by the Administrator of the General Services Administration, real property no longer needed by a Federal agency can be transferred without reimbursement to the Secretary of Interior if the land has particular value for migratory birds, or to a State agency for other wildlife conservation purposes.

Federal Records Act (1950): Directs the preservation of evidence of the government's organization, functions, policies, decisions, operations, and activities, as well as basic historical and other information.

Fish and Wildlife Act (1956): Established a comprehensive national fish and wildlife policy and broadened the authority for acquisition and development of refuges.

Refuge Recreation Act (1962): Allows the use of refuges for recreation when such uses are compatible with the refuge's primary purposes and when sufficient funds are available to manage the uses.

Wilderness Act (1964), as amended: Directed the Secretary of Interior, within 10 years, to review every roadless area of 5,000 or more acres and every roadless island (regardless of size) within National Wildlife Refuge and National Park Systems and to recommend to the President the suitability of each such area or island for inclusion in the National Wilderness Preservation System, with final decisions made by Congress. The Secretary of Agriculture was directed to study and recommend suitable areas in the National Forest System.

Land and Water Conservation Fund Act (1965): Uses the receipts from the sale of surplus Federal land, outer continental shelf oil and gas sales, and other sources for land acquisition under several authorities.

National Wildlife Refuge System Administration Act (1966), as amended by the National Wildlife Refuge System Improvement Act (1997)16 U.S.C. 668dd668ee. (Refuge Administration Act): Defines the National Wildlife Refuge System and authorizes the Secretary to permit any use of a refuge provided such use is compatible with the major purposes for which the refuge was established. The Refuge Improvement Act clearly defines a unifying mission for the Refuge System; establishes the legitimacy and appropriateness of the six priority public uses (hunting, fishing, wildlife observation and photography, or environmental education and interpretation); establishes a formal process for determining compatibility; established the responsibilities of the Secretary of Interior for managing and protecting the System; and requires a Comprehensive Conservation Plan for each refuge by the year 2012. This Act amended portions of the Refuge Recreation Act and National Wildlife Refuge System Administration Act of 1966.

National Historic Preservation Act (1966), as amended: Establishes as policy that the Federal Government is to provide leadership in the preservation of the nation's prehistoric and historic resources.

Architectural Barriers Act (1968): Requires federally owned, leased, or funded buildings and facilities to be accessible to persons with disabilities.

National Environmental Policy Act (1969): Requires the disclosure of the environmental impacts of any major Federal action significantly affecting the quality of the human environment.

Uniform Relocation and Assistance and Real Property Acquisition Policies Act (1970), as amended: Provides for uniform and equitable treatment of persons who sell their homes, businesses, or farms to the Service. The Act requires that any purchase offer be no less than the fair market value of the property.

Endangered Species Act (1973): Requires all Federal agencies to carry out programs for the conservation of endangered and threatened species.

Rehabilitation Act (1973): Requires programmatic accessibility in addition to physical accessibility for all facilities and programs funded by the Federal government to ensure that anybody can participate in any program.

Archaeological and Historic Preservation Act (1974): Directs the preservation of historic and archaeological data in Federal construction projects.

Clean Water Act (1977): Requires consultation with the Corps of Engineers (404 permits) for major wetland modifications.

Surface Mining Control and Reclamation Act (1977) as amended (Public Law 95-87) (SMCRA): Regulates surface mining activities and reclamation of coal-mined lands. Further regulates the coal industry by designating certain areas as unsuitable for coal mining operations.

Executive Order 11988 (1977): Each Federal agency shall provide leadership and take action to reduce the risk of flood loss and minimize the impact of floods on human safety, and preserve the natural and beneficial values served by the floodplains.

Executive Order 11990: Executive Order 11990 directs Federal agencies to (1) minimize destruction, loss, or degradation of wetlands and (2) preserve and enhance the natural and beneficial values of wetlands when a practical alternative exists.

Executive Order 12372 (Intergovernmental Review of Federal Programs): Directs the Service to send copies of the Environmental Assessment to State Planning Agencies for review.

American Indian Religious Freedom Act (1978): Directs agencies to consult with native traditional religious leaders to determine appropriate policy changes necessary to protect and preserve Native American religious cultural rights and practices.

Fish and Wildlife Improvement Act (1978): Improves the administration of fish and wildlife programs and amends several earlier laws including the Refuge Recreation Act, the National Wildlife Refuge System Administration Act, and the Fish and Wildlife Act of 1956. It authorizes the Secretary to accept gifts and bequests of real and personal property on behalf of the United States. It also authorizes the use of volunteers on Service projects and appropriations to carry out a volunteer program.

Archaeological Resources Protection Act (1979), as amended: Protects materials of archaeological interest from unauthorized removal or destruction and requires Federal managers to develop plans and schedules to locate archaeological resources.

Federal Farmland Protection Policy Act (1981), as amended: Minimizes the extent to which Federal programs contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses.

Emergency Wetlands Resources Act (1986): Promotes the conservation of migratory waterfowl and offsets or prevents the serious loss of wetlands by the acquisition of wetlands and other essential habitats.

Federal Noxious Weed Act (1990): Requires the use of integrated management systems to control or contain undesirable plant species, and an interdisciplinary approach with the cooperation of other Federal and State agencies.

Native American Graves Protection and Repatriation Act (1990): Requires Federal agencies and museums to inventory, determine ownership of, and repatriate cultural items under their control or possession.

Americans With Disabilities Act (1992): Prohibits discrimination in public accommodations and services.

Executive Order 12898 (1994): Establishes environmental justice as a Federal government priority and directs all Federal agencies to make environmental justice part of their mission. Environmental justice calls for fair distribution of environmental hazards.

Executive Order 12996 Management and General Public Use of the National Wildlife Refuge System (1996): Defines the mission, purpose, and priority public uses of the National Wildlife Refuge System. It also presents four principles to guide management of the System.

Executive Order 13007 Indian Sacred Sites (1996): Directs Federal land management agencies to accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners, avoid adversely affecting the physical integrity of such sacred sites, and where appropriate, maintain the confidentiality of sacred sites.

National Wildlife Refuge System Improvement Act (1997): Considered the "Organic Act of the National Wildlife Refuge System. Defines the mission of the System, designates priority wildlife-dependent public uses, and calls for comprehensive refuge planning.

National Wildlife Refuge System Volunteer and Community Partnership Enhancement Act (1998): Amends the Fish and Wildlife Act of 1956 to promote volunteer programs and community partnerships for the benefit of national wildlife refuges, and for other purposes.

National Trails System Act: Assigns responsibility to the Secretary of Interior and thus the Service to protect the historic and recreational values of congressionally designated National Historic Trail sites.

Appendix G: Bibliography

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Appendix H: Mailing List

Appendix H: Mailing List

Federal Officials

U.S. Senator Debbie Stabenow
U.S. Senator Carl Levin
U.S. Representative Dave Camp
U.S. Representative James Barcia

Federal Agencies

USDA/Natural Resource Conservation Service
USDI/Fish and Wildlife Service, Albuquerque, New Mexico; Anchorage, Alaska; Atlanta, Georgia; Denver, Colorado; Fort Snelling, Minnesota; Hadley, Massachusetts; Portland, Oregon; Washington, D.C.
USDI/East Lansing Private Lands Office; East Lansing Field Office; Alpena Fishery Resources Office; Ann Arbor Law Enforcement Field Office; Great Lakes Science Center, Biological Resources Division, USGS
USEPA, Great Lakes National Program Office, Chicago, Illinois;
USNPS, Sleeping Bear Dunes National Lakeshore, National Park Service, Omaha, Nebraska

State Officials

Governor John Engler
Senator Michael Goschka
Representative Carl Williams
Representative Jim Howell
Rep. A.T. Frank

State Agencies

Director Russell Harding, Michigan Department of Environmental Quality
Director K.L. Cool, Michigan Department of Natural Resources
State Historic Preservation Officer, Lansing, Michigan
Michigan Sea Grant College Program

City/County/Local Governments

City Manager, City of Saginaw, Michigan
Superintendent of Parks, City of Saginaw, Saginaw, Michigan
Chairman, Saginaw County Board of Commissioners
Director, Saginaw County Parks and Recreation Commission
Planning Director, Saginaw County Metropolitan Planning Commission
Township Manager, Thomas Township, Michigan
Township Manager, Bridgeport Township, Michigan
Township Manager, Saginaw Township, Michigan
Supervisor, Spaulding Township, Michigan
Supervisor, James Township, Michigan
Saginaw County Convention and Visitor Bureau

Libraries

Hoyt Main Public Library
Bridgeport Public Library

St. Charles District Library
Thomas Township Library
Zavel Memorial Public Library

Organizations

Pheasants Forever
Shiawassee Flats Advisory Council
The Nature Conservancy
National Audubon Society
Trout Unlimited
Michigan Duck Hunters Association
Ducks Unlimited
Great Lakes Commission
Saginaw Valley Audubon Society
MUCC District 10
Michigan Mountain Bike Association
Michigan Deer Hunters Association
Michigan United Conservation Clubs, Lansing
Castle Museum, Saginaw County Historical Society
Wildlife Management Institute
PEER Refuge Keeper
The Wilderness Society, Washington, D.C.
National Wildlife Federation, Ann Arbor, Michigan
Sierra Club, Midwest Office, Madison, Wisconsin
National Wildlife Refuge Association, Washington, D.C.
The Conservation Fund, Arlington, Virgina
Saginaw Bay WIN
Saginaw Valley Land Conservancy
Ruffed Grouse Society
Partnership for the Saginaw Watershed
Chippewa Nature Center
Friends of Shiawassee National Wildlife Refuge

Corporate

Johnny Panther Quest
Spicer Engineering

Newspapers

Saginaw News
Bay City Times
Flint Journal
Township Times
Birch Run-Bridgeport Herald

Tribes

Saginaw Chippew Tribe, Mt. Pleasant, Michigan

Individuals

Individuals who participated in open houses or focus groups or who requested to be on the mailing list.

Appendix I: List of Preparers

Appendix I: List of Preparers

Mark Beaudin, *Park Ranger*
Mr. Beaudin wrote the introduction.

James J. Dastyck, *Wildlife Biologist, Shiawassee National Wildlife Refuge*
Mr. Dastyck is the primary author of the resource and biological sections.

Edward P. DeVries, *Primary Refuge Operations Specialist, Shiawassee National Wildlife Refuge*
Mr. DeVries assisted in overall direction, supervision, writing and editing.

John Dobrovolny, *Regional Historian, Region 3*
Mr. Dobrovolny is the primary author of cultural resource sections.

Rebecca Goche, *Park Ranger, Shiawassee National Wildlife Refuge*
Ms. Goche is the primary author of public use sections.

James Hazelman, *Refuge Operations Specialist, Shiawassee National Wildlife Refuge*
Mr. Hazelman is the primary author of private lands sections.

Jane Hodgins, *Technical Writer/Editor, Region 3*
Ms. Hodgins served as primary editor.

James Hudgins, *Station Manager, East Lansing Private Lands Office*
Mr. Hudgins is the primary author of the Michigan Wetland Management District section.

Sean Killen, *Cartographer, Region 3*
Mr. Killen produced figures and maps from GIS.

Judy McClendon, *Project Leader, Southern Missouri Ascertainment Office, Region 3*
Ms. McClendon wrote the initial draft of the environmental assessment.

John H. Schomaker, *Refuge Planning Specialist, Region 3*
Mr. Schomaker provided coordination and served as co-author.

Douglas G. Spencer, *Refuge Manager, Shiawassee National Wildlife Refuge*
Mr. Spencer provided overall direction, supervision, and coordination with agencies and the public. He assisted in writing and editing.

We gratefully acknowledge the help of Murray Laubhan and Richard Schroeder of the U.S. Geological Survey, Biological Resources Division, Midcontinent Ecological Science Center, Fort Collins, Colorado, for their guiduance and assistance in developing the habitat goals and objectives. We really appreciate their effort and expertise.

Appendix J: Summary and Disposition of Public Comments

Appendix J: Summary and Disposition of Public Comments on Draft Comprehensive Conservation Plan

Ten organizations and five individuals submitted comments on the Draft Comprehensive Conservation Plan. The following organizations submitted comments: Frankenmuth Conservation Club, Michigan Bow Hunters Association, Michigan Department of Natural Resources, Michigan United Conservation Clubs, Saginaw City Council, Saginaw County Board of Commissioners, Saginaw County Mosquito Abatement Commission, Saginaw County Mosquito Abatement Commission Technical Advisory Group, Shiawassee Flats Citizen & Hunters Association, Wildlife Management Institute.

We considered the comments as we prepared the final Comprehensive Conservation Plan. The following paragraphs describe the comments and our response.

Mosquito Control

The Saginaw County Mosquito Abatement Commission (SCMAC) expressed concerns that eliminating routine mosquito control would create a public health threat from mosquito-borne disease. The SCMAC, however, failed to identify any specific human health threat that would result from eliminating the current mosquito control operations on the Refuge. None of the species currently targeted for control on the Refuge is a primary vector of Eastern Equine Encephalitis, St. Louis Encephalitis, or West Nile virus (a disease that has yet to be identified in Michigan). LaCrosse encephalitis is vectored primarily by the treehole mosquito, *Ochlerotatus triseriatus*, a species that has not been targeted for control on the Refuge. The mosquito species currently being controlled on the Refuge are all weak fliers, and seldom venture far from their woodland larval habitat.

The SCMAC questioned the authority of the Regional Director of the U.S. Fish and Wildlife Service to determine a human health emergency. As stated in the CCP, the Regional Director would determine a human health emergency "for purposes of treatment of refuge lands for disease-carrying mosquitoes". To clarify this, it is expected that the State would initially determine a general health emergency and the Regional Director could, after consultation, determine that the health emergency necessitates the treatment of mosquitoes on Refuge lands.

The SCMAC stated that mosquito pesticides are "unlikely to have substantial effects on aquatic and/or flying insects or fish in or near wetlands". Numerous scientific studies have indicated that all currently used mosquitocides have the potential to impact non-target organisms. A published multi-year study conducted in Minnesota indicated significant food web effects from the long-term use of Bti, the pesticide currently being applied on the Refuge by SCMAC. (Hershey et al. 1998, Niemi et al. 1999)

The SCMAC also claimed that by eliminating mosquito control on the Refuge, the Service would be in violation of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and its companion legislation, the Food Quality Protection Act (FQPA). The objective of FIFRA and FQPA is to protect human health and the environment from pesticides

through appropriate registration and labeling procedures. Neither FIFRA nor FQPA requires federal agencies to control mosquitoes.

The above discussion also responds to comments received from the Saginaw County Mosquito Abatement Commission Technical Advisory Group.

As stated in the plan, the Refuge will continue to cooperate with the Saginaw County Mosquito Abatement Commission in the monitoring of mosquito populations on Refuge lands and in the removal of tires or other debris that serve as artificial breeding sites.

Croplands

Some comments supported the draft plan's reduction of croplands. Other comments cautioned against elimination of food plots and proposed that crop depredation will continue to be an issue for the next 15 years and beyond. The value of cropland for geese and wildlife viewing were also noted. These points are addressed in the rationale of objective 1.8. In addition, we note that when we decrease cropland we will increase shallow and deepwater habitat, which will provide alternative food sources for migrating waterfowl and other wetland-dependent migratory birds.

We will consider the use of small food plots to enhance wildlife observation as we write a more detailed step-down plan for public use. We have noted this intention in our cropland discussion in the CCP.

The seriousness of the concern related to crop depredation is dependent upon the rate of conversion of lands within the Refuge and the rate of changing land use outside the Refuge. Both of these rates are uncertain. As part of the entire plan, we will monitor our management of croplands and its effects and consider these effects during plan review and revision.

Habitat Management

Organizations criticized the objectives for deep-water and moist soil habitats. They felt that the acres specified were too low and that the habitats should be maximized for migratory species. Our intent is to maximize the acres available. But to control the vegetation in these habitats, it is not possible to have all the acres available each year. We feel that the objectives better reflect what actually occurs and is realistic under active management. Also, the objectives set minimum acres; we will attempt to exceed theses minimums whenever possible.

A comment suggested that we place greater stress on the importance of the Refuge to waterfowl, especially the Southern James Bay Population of interior Canada geese. We recognize that a purpose of the Refuge is for waterfowl. The Refuge supports migrants in mid-migration with deep water habitat and supports waterfowl production with shallow water habitats. We have amended wording in the plan to reenforce the waterfowl purpose of the Refuge.

An organization urged us to state a preference for native plants in grasslands (objective 1.7). Native plants are our preference. We have added a phrase in the plan that makes this preference more explicit.

Wildlife-Dependent Recreation

Organizations and individuals encouraged us to emphasize hunting, fishing, and trapping more in the plan. Their comments included requests to include the importance of hunting and active management of habitats in interpretive materials; expand and maximize hunting, fishing, and trapping opportunities. Two organizations wrote in support of the "Early Youth Waterfowl Hunt." Another comment urged us to mention the potential need to control turkey populations through hunting.

The comments related to interpretive materials, hunting, and trapping will be considered when the more detailed step-down plans are written and revised. We note, however, that Congress did not designate trapping as a "wildlife-dependent recreational use" in the National Wildlife Refuge System Improvement Act of 1997. Trapping is not considered as one of the "Big 6" activities. We recognize trapping as a management technique and we will use it, if necessary, to manage populations on the Refuge for specific purposes. The topics covered in the step-down plans will include the "Early Youth Waterfowl Hunt" and the possibility of a turkey hunt. Bank fishing access is expanded within the plan. If the fishing use does not show a detrimental effect on wildlife or refuge resources, we will consider additional access sites during future plan reviews. We also recognize the potential for conflicts between people and deer, turkey and Canada geese. If conflicts increase to an unacceptable level, we will modify our hunting program to address the conflicts.

Trails

An organization cautioned that trails should not conflict with hunting and other priority uses. Two individuals suggested specific alignments for new trails and associated facilities within the Refuge. We think trails facilitate the wildlife-dependent recreational uses of observation, photography, environmental education, and interpretation. We do not think the existing and proposed trails conflict with the hunting that occurs on the Refuge. We have considered adding more trail access in the next 15 years. We think that we should construct the trails that are proposed in the plan and monitor their use and effect on wildlife in order to meet our "Wildlife First" mission. If trail use does not show an effect on wildlife, we will consider additional trails during future plan reviews.

Other Topics

An individual urged us to increase our consideration of reptiles and amphibians in the plan and to include more specificity, highlight the monitoring of these species, consider these species in developing acquisition priorities and in management, monitor the impact of public use on these species, increase the emphasis on these species in education programs, and use volunteers to benefit these species. These comments will be considered and incorporated as more specific step-down plans are written. We recognize that reptiles and amphibians are an important aspect of the biological web on the Refuge. We intend to not harm these species and to better understand their status on the Refuge during the life of the plan.

An individual repeated the need for additional law enforcement that was heard during the scoping meetings. The additional law enforcement positions proposed in the plan address this need.

An organization wrote encouraging us to restore the natural stream flow to the Flint River by installing a cofferdam on the Spaulding Drain. The organization correctly identified this as a problem that is off the Refuge. We expect to address this issue as part of our watershed and water quality activities within the Comprehensive Conservation Plan.

References

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